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EPA Superfund
Record of Decision:

ABERDEEN PROVING GROUND (EDGEWOOD AREA)
EPA ID: MD2210020036
OU 02
EDGEWOOD, MD
10/11/1994

Text:

Interim Remedial-Action
U.S. ARMY ABERDEEN PROVING GROUND <IMG SRC 0395187>
OLD O-FIELD SOURCE AREA
(O-Field Operable Unit 2)

Aberdeen Proving Ground, Maryland

RECORD OF DECISION

FINAL DOCUMENT

September 1994

In accordance with Army Regulation 200-2, this document is intended to comply with the National Environmental Policy Act (NEPA) of 1969.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Old O-Field Source Area, Edgewood Area, U.S. Army Aberdeen Proving Groun
Maryland.

STATMENT OF BASIS AND PURPOSE

This decision document presents a selected interim remedial action
Source
Area, which is Operable Unit 2 (OU2) of the O-Field Area at Aberdeen Pro
MD. The selected
remedial action was chosen in accordance with the requirements of the Co
Environmental
Response, Compensation, and Liability Act of 1980 (CERCLA), as amended b
Superfund
Amendments and Reauthorization Act of 1986 (SARA), and to the extent pra
National Oil and
Hazardous Substances Pollution Contingency Plan (40 CFR 300). This deci
explains the

factual basis for selecting the remedy for OU2 and the rationale for the information supporting this remedial action decision is contained in the Administrat site.

The State of Maryland Department of the Environment concurs with th remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the site implementing the response actions selected in this Record of Decision (R an imminent and substantial endangerment to public health, welfare, or the environme

DESCRIPTION OF THE REMEDY

This operable unit is the second of four that are planned for the site unit (OU1) addressed the contaminated groundwater emanating from Old O-Field, and the OU1 is currently under construction. This Record of Decision has been developed f 2 (OU2) of the O-Field area. This remedy addresses the principal threat posed by the potential for an accidental release of chemicals in to the air. The function of this ope the risk of an accidental release of chemical warfare materials (CWM) from the site by possibility of a fire at the site, reducing the likelihood and potential effects of an unp ordnance, and minimizing both the likelihood and the potential effects of evaporative from a subsurface release. The selected remedial action is an interim remedy, and continued investigation into a more permanent remedy.

The major components of the selected remedy include:

A Permeable Infiltration Unit (PIU) will be constructed on top of the be constructed principally of sand and other granular materials. Constru reduce the threat of a release of CWM by covering the site with non-flammable will serve to cut off the air flow to the surface of Old O-Field, stop erosion provide a blast-resistant layer on top of the ordnance, and provide a vapor b emission of CWM from an underground release.

An air monitoring system will be installed within the PIU to dete CWM within the pore spaces of the sand.

A sprinkler system will be contructed on top of the PIU that will b spraying water or other solutions on the PIU. If a CWM release is detected system, then the sprinkler system will be activated. The water sprayed ont vapor barrier within the sand to prevent an air release of CWM and will a degradation of CWM.

Treatability studies will be performed using the sprinkler system to a solutions to the PIU. The resuts of these studies will be used to evaluate t enhanced leaching of the contaminants from soil and buried containers to the addition, the surface of the PIU will be monitored to evaluate the rated subsiden

The ability of the groundwater extraction and treatment system that construction for OU1 (contaminated groundwater emanating from Old O-Field) to capture an contaminated groundwater emanating trom Old O-Field will be verified. In additi of the groundwater monitoring program to detect changes in the site hydrog groundwater chemistry will be verified.

The remedy specified herein will be one component of the overall re O-Field area This action will be consistent with any current or planned future remedi site to the extent practicable.

STATUTORY DETERMINATIONS

This selected remedy is protective of human health and the environm Federal and State requirements that are legally applicable or relevant and appropri action, and is cost effective. Although this action is not intended to fully addres for permanence and treatment to the maximum extent practicable, this interim furtherance of that statutory mandate. Because this action does not constitute the final re statutory preference for remedies that employ treatment that reduces toxicity, mob a principal element, although partially addressed by this remedy, will be addressed final response action. Subsequent actions will address the threats posed by the condit maximum extent practicable.

Because this action will result hazardous substances remaining on-s health-based levels, a review will be conducted within five years after implementatio ensure that the remedy continues to provide adequate protection of human health and the Because this is an interim action, review of this site and of this remedy will contin the U.S. Environmental Protection Agency (EPA) continue to develop final remedial the O-Field area.

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Richard W. Tragemann
Major General, U.S. Army
Commander, U.S. Army Aberdeen Proving Ground

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Lewis D. Walker
Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health)

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Peter H. Kostmayer
Regional Administrator
U.S. Environmental Protection Agency, Region III

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1.0 SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Army Aberdeen Proving Ground (APG) is a 72,516-acre insta
in
southeastern Baltimore County and southern Harford County, Maryland, on
shore of the upper
Chesapeake Bay (Figure 1-1). The installation is bordered to the east a
Chesapeake Bay,
to the west by Gunpowder Falls State Park, the Crane Power Plant and res
and to the north
by the towns of Edgewood, Magnolia, Perryman, and Aberdeen. APG is divi
areas by the
Bush River: the Edgewocd Area of APG lies to the west of the river and
Area lies to the
east.

The O-Field area is an area of approximately 259 acres located on
peninsula
in the Edgewood Area (Figure 1-2). It is bordered on the north and east by

the south
by H-Field, and on the west by the Gunpowder River. Watson Creek drains
Gunpowder River
through a narrow culvert under Watson Creek Road. The Gunpowder River,
into
Chesapeake Bay.

The O-Field area contains two (2) known disposal areas and one (1)
area
(Figure 1-3). The northern disposal area is designated as Old O-Field,
used for
disposal activities from the late 1930s to 1953. Old O-Field is located
Creek and east
of Watson Creek Road. South of Old O-Field and east of Watson Creek Roa
area, known
as New O-Field. New O-Field was used from the mid 1950s to the early 19
destruction and
disposal area. The suspected disposal area known as the "Pit Site" is o
Watson Creek
Road near the Gunpowder River. The "Pit Site" was reportedly used from
mid-1950s as
a disposal area.

Old O-Field is a 4.5-acre site that was used by the Army for the s
disposal, and
destruction of chemical warfare materials (CWM), decontaminating chemica
laboratory
samples, and contaminated equipment. The site is located within a restr
and access
to the site is strictly controlled. The site is surrounded by a chain-l
supplemented by
other physical security countermeasures, and is patrolled on a 24-hour b

Old O-Field is located on a local topographic high, approximately
level. There
is approximately 4 to 6 feet of relief across Old O-Field. The terrain
to Watson
Creek, and toward the west, to the Gunpowder River. The area around Old
wooded, and much
of the area around Watson Creek is a marsh. The groundwater underlying
flows toward the
east and northeast, and discharges to Watson Creek.

At present, the construction of the Operable Unit 1 (OU1) groundwa
treatment
system is underway, so workers are present at Firing Position 5 (located
northwest of
Old O-Field). In addition, workers are present a H-Field (south of New
M-Field (north of Old
O-Field). Large numbers of civilian and military personnel work on the
Gunpowder Neck and
within the industrial areas of Edgewood Area.

The residential areas closest to Old O-Field lie approximately 2.7

military
housing within the Edgewood Area of APG), 3 miles to the west (Graces Qu
Maryland) and 4.5
miles to the north-northwest (Edgewood, Maryland, and Joppatowne, Maryla
addition, Kent County,
Maryland, lies 6 miles west of Old O-Field.

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<IMG SRC 0395187B>

<IMG SRC 0395187C>

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

APG was established in 1917 as the Ordnance Proving Ground and was de
formal
military post in 1919. Testing of ammunition and other equipment and op
schools began
at APG in 1918. Between this time and the onset of World War II, activi
included research and
development and large-scale testing of a wide variety of munitions, weap
equipment
immediately prior to and during World War II, the pace of testing increa
During the war,
personnel strength at APG exceeded 30,000. Similar but smaller-scale in
development and
testing activities were experienced during the Korean and Vietnam confli

APG's primary mission continues to be the testing and development of
munitions,
vehicles, and a wide variety of support equipment. Within the Edgewood
warfare research,
development, and related activities have occurred. Specific activities
included
laboratory research, field testing of chemical munitions, pilot-scale ma
production-scale
chemical agent manufacturing.

Many areas of the Gunpowder Neck of the Edgewood Area have been us areas for the testing of ordnance; as such, ordnance have been tested and fired in there is the potential for encountering unexploded ordnance (UXO) and/or intact or le liquid-filled rounds deposited during testing and firing. Disposal and testing activities ha areas along the Gunpowder Neck. O-Field and J-Field were the major disposal areas (history of O-Field is discussed in more detail below). Currently, testing of combat tracke H-Field (to the south of O-Field), and testing of obscurants (e.g., smoke screens) takes (immediately north of O-Field).

2.1 HISTORY OF OLD O-FIELD

Periodic disposal of waste materials at the O-Field area began bef first documented usage of Old O-Field occurred in May 1941 (Yon et al, 1978), records suggest that disposal activities occurred in the late 1930s. Disposal c items in excavated trenches and then covering the trenches with soil. Records in the burial trenches were 100 yards long, 10 feet deep, and 10 feet wide; however, m trenches are much shorter. The existence of 35 trenches is documented in the historical r 1978). However, inspection of survey notes and historical aerial photographs reveals tha pits are not distinct. As disposal activities continued, trenches were created which and intersect other trenches. Because of this, the total number of trenches and their known. The last pit used for disposal of materials within Old O-Field was closed in June

During the period of 1941 to 1949, tons of chemical-filled/explosive- contaminated plant equipment, pipes, and tanks were buried or placed on surface in the area of Old O-Field. Interviewed personnel stated that the area contained 55 mustard and lewisite (blistering agents); items filled with chloroacetophenone, chlo chloroform (tear agents), and adamsite (vomiting agent); munitions containing explosive c munitions filled with white phosphorus and other CWM.

During August 1946, the unloading and decontamination operations o Lee, a Liberty ship containing mustard-filled German munitions captured during were conducted

at Edgewood Arsenal. The ship was anchored in the eastern channel of th
Bay between
Worton Point and Stoops Point. The material was then loaded onto barges
the Bush River

to the Edgewood dock. Contaminated empty German bombs (formerly mustard
contaminated
wood, and dunnage were placed at Old O-Field for disposal.

In June 1949, a spontaneous ignition occurred in one of the dispos
where
a large variety of chemical-filled/explosive loaded munitions had been b
of this explosion,
a broad area was contaminated with CWM, and unexploded ordnance was di
around the area.
Immediately after this incident, an inspection was conducted by the Ar
Explosive Safety
Board. A directive was issued calling for a thorough cleanup of the c
November
1949, the responsibility for the disposal and cleanup operations at Ol
to the Command
of the Technical Escort Detachment at Edgewood Arsenal.

2.2 CLEANUP ACTIVITIES AT OLD O-FIELD

2.2.1 LTC Dean Dickey's Affidavit

The source of the information concerning early cleanup activitie
testimonial
prepared by LTC Dean Dickey (Yon et al, 1978), who was Officer-In-Char
at Old O-Field
and who later returned to the Edgewood Area as Commander of the U.S Ar
Escort Unit
(TEU).

Between September, 1949, and the early 1950s, LTC Dickey's team
surface sweep
and clearance of Old O-Field. The following activities were performed

Fuzes, bursters, and boosters were gathered, placed in drums, and
handling of
items and drums in Old O-Field was slowed down by the quantity of
in the
ground, which ignites and burns when exposed to air.

Several hundred drums, mustard-filled rounds (including German mus
250-kg and 500-kg
rounds), and tear gas-filled rounds were recovered from the surfac
The mustard-
filled rounds and white phosphorus rounds were destroyed by placin

lumber
and napalm and burned.

Old O-Field was also used for the destruction of leaking mustard a
containers.
The agent was destroyed by pouring it into flat steel pans and ign
of lime.

During the recovery activities, the surface of Old O-Field was dec
pouring
Decontaminating Agent Non-Corrosive (DANC, which contains approxim
1,1,2,2-
tetrachloroethane) and lime (calcium hydroxide) on the field. App
barrels of
DANC were used. Contaminated soil was then scooped up and put on
O-Field. The
trees were decontaminated by placing TNT under cans of lime and de
to spread
the lime.

The Old O-Field pits and their contents were then buried. Hundred
oil were
pumped into the pits. The entire field was then sprayed with fuel
placed in
the pits. The pits and the entire area burned for two days and nu
occurred.
The date for this phase of the cleanup is not given, but is presum
during the
early 1950s.

During these cleanup activities, a number of unplanned detonations
explosions
resulted in the release of mustard to the surface of Old O-Field a
trees and
surface water bodies.

Other portions of LTC Dickey's affidavit indicate that, although a
disposed
materials have been recovered from the surface of Old O-Field and some o
much larger
quantity of munitions, bulk containers and other items potentially remai

2.2.2 U.S. Army Technical Escort Unit Surface Sweeps of Old O-Field

From the late 1960s to the early 1970s, the U.S. Army Technical Es
surface
sweeps of the area. A number of suspeet CWM-filled rounds were recovere
O-Field, temporarily
stored in Conex containers at Old O-Field, and then transported and stor
bunkers at N-

Field.

2.3 PRESENT CONDITION OF OLD O-FIELD

At present, Old O-Field is heavily vegetated. Some of the trees h as 8 inches and are more than 20 feet in height; this indicates that their ta extend through the upper confining unit. Smaller bushes cover and obscure the remainder of animals such as foxes have been observed inside the fenced area.

The surface of the field is highly irregular; there are areas wher occurred. This indicates that the trenches and pits are eroding and collapsing. C of four trenches are visible in the field. A large number of ordnance items, dr ammunition crates, canisters, and miscellaneous scrap metal items are visible on the surfac within the open trenches.

In addition to the items present within the fenced area of Old O-F of UXO items were encourrtered outside of Old O-Field during the construction o support of the Operable Unit 1 groundwater treatment system project. The presence of t of Old O-Field is most likely due to the "kick-out" of items during past detonati disposal activities. These items pose a hazard to workers engaged in any project Old O-Field, and an accident involving these items may have an impact on Old O-Field, inc initiation of fires or detonations.

2.4 PREVIOUS INVESTIGATIONS

This section summarizes the results of the environmental studies t conducted at Old O-Field. Because this ROD is focused on the source area of Old O-Fi groundwater and surface water quality data are not presented in this summary.

2.4.1 Environmental Survey

An Environmental Survey of the Edgewood Area of APG was conducted in 1978 by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), now known as U.S. Army Environmental Center (AEC) (Nemeth et al., 1983), to determine if chemic contamination from past operations was presenting a hazard to the off-post environment. Analysi sample collected from a monitoring well located immediately east of Old O-Field arsenic, volatile organic compounds (VOCs), and 1,4-dithiane (a thermal breakdown product of musta concentrations above 1,000 æg/L; semi-volatile compounds were detected at lower levels. Thes that VOCs and chemical agent degradation products are being released by Old O-Field in groundwater.

2.4.2 Records Review

A records review (Yon et al, 1978) used available documents and to reconstruct a general history of site operations at O-Field. The invest O-Field contained 35 disposal pits, and 3 additional pits exist on the west side Road. A later review of historical survey notes showed that only one pit may have been Creek Road, whereas two of the suspected pits were within Old O-Field (Parks 1986).

2.4.3 Surface Water Quality Study

The U.S. Army Environmental Hygiene Agency (AEHA) conducted a su quality and biological study d Watson Creek and nearby creeks (U.S. Army Environment Agency, 1977). Due to a lack of tidal flushing in Watson Creek, unusually high organic detected.

2.4.4 Hydrogeologic Investigation

In 1984, the U.S. Geological Survey (USGS) began a study to invest extent, and possible migration of contaminants from the Old O-Field site. The final Vroblesky et al. (USGS, 1991) presents a preliminary characterization of the contamination of th surface water, and bottom sediment in the O-Field area of APG, and describes the probable chemical effects of relevant remedial actions on the groundwater at the site.

2.4.5 RCRA Facility Assessment

In 1986, while the USGS study was ongoing, the U.S. Environmenta Agency (EPA) issued a Resource Conservation and Recovery Act (RCRA) permit to APG t Solid Waste Management Units (SWMUs) with potential to release hazardous wastes to environment. A RCRA

Facility Assessment (RFA) report by Nemeth (1989) documents historical
Edgewood Area
of APG related to solid waste management, and identifies and describes
the
recommendations of the report is that consideration be given to additi
work addressing
the New O-Field area (Nemeth, 1989).

2.4.6 Focused Feasibility Study of Old O-Field Source Removal Options

In 1987, the Army performed an engineering study for Old O-Field
feasibility
of implementing source control (ICF Technology, 1987). This work was pe
Environmental
Management Office of Aberdeen Proving Ground (now part of the Directorat
Health, and
Environment [DSHE]). The study identified remedial alternatives that in
removal, in-place
destruction, and permanent isolation. More than a dozen remedial altern
evaluated in this
study; in addition, a variety of innovative excavation techniques were c
screened. The
technologies evaluated as being potentially implementable and effective

In-situ vitrification of the entire mass of soil and materials con
of burial sites
at Old O-Field;

Entombment of all wastes and hazardous materials at the site;

Mechanical excavation, sorting, and disposal or treatment of hazar
site using
remote-controlled equipment; and

Hydraulic excavation of wastes and munitions at the field.

The following conclusions were reached about the condition of Old O-Fiel
for a source
control action such as would be accomplished by the above technologies:

Based on the current state of understanding of Old O-Field, t
the
site to human health and the environment is lower than the ri
corrective
action at the site that involves destruction or removal activ

There are significant short-term risks posed by implementatio
considered
technologies

None of the technologies considered is sufficiently developed
selection
and implementation at Old O-Field. Research, development, an
the
technology would be required prior to implementation.

2.4.7 Old O-Field Groundwater Treatment Remedy

A Focused Feasibility Study (FFS) was performed to evaluate remedi
the
groundwater (OU1) at Old O-Field (USATHAMA, 1990). As part of this stud
tests were performed
to aid in designing a groundwatsr extraction system (USATHAMA, 1991b).
tests were
conducted to evaluate the implementability of various groundwater treatm
A number of
promising technologies were tested at both the bench- and pilot-scale.

The data obtained from the treatability tests were used to select
technology.
Groundwater extraction and treatment using chemical precipitation for re
inorganic analytes
followed by ultraviolet oxidation for removal of the organic contaminant
the proposed
remedial treatment technology (USATHAMA, 1991c). Treated groundwater wi
discharged to the
Gunpowder River. Based on the results of the FFS, the aquifer tests and
studies, a
Proposed Plan was developed which addresses groundwater extraction and t
Old O-Field
area (U.S. Department of the Army, 1991a). A Record of Decision which d
remedy selection
was signed by the Army and U.S. EPA Region III In September 1991 (U.S. D
the Army,
1991b).

The Army then developed the Conceptual Design for the groundwater
extraction,treatment, and
discharge system (USATHAMA, 1991d). Construction of the treatment plant
underway. Based
on data gathered after completion of the Conceptual Design, air strippin
adsorption units
have been added to the treatment train to provide greater flexibility in
compounds.
When completed, this system will intercept and treat the contaminated gr
emanating from Old
O-Field. The purpose of the action is to prevent loading of contaminant
Creek.

2.4.8 Groundwater and Surface Water Sampling, Fall 1991

In November 1991, the Army collected groundwater samples from all
monitoring wells.
Surface water samples were also collected from Watson Creek and the Gunp

The purpose
of the investigation was to obtain information regarding present levels
use in
completing the design of the OU1 treatment plant.

2.4.9 O-Field Area Remedial Investigaiton/Feasibility Study

Presently, the Army is performing an RI/FS of the entire O-Field s
consists of
the installation of monitoring wells and the collection and analysis of
water,
sediment, groundwater, air, and soil. Extensive soil gas surveys and ge
were also

performed. Surface soil samples were collected immediately outside th
surrounding Old O-Field
(due to safety restrictions on Old O-Field, personnel were not allowed

Because the toxicity of the military-specific compounds is not w
tests were
conducted to evaluate potential impacts to aquatic life. Macroinverte
in sediment
in Watson Creek and the Gunpowder River and analyzed to evaluate the p
bioaccumulation
of contaminants. Further hydrogeologic investigation of the area has
through aquifer
testing and groundwater flow modeling. Additional information concern
may be obtained
from the RI/FS Work Plan (USATHAMA, 1992) and the Phase I Rl Report (A
1994a).

A Focused Feasibility Study for the Old O-Field Source Area was
1994b). This
report evaluated the risks posed by Old O-Field and the potentially ap
technologies for
mitigating these risks. The Proposed Plan for the Old O-Field source
and this Record
of Decision are based on the results of the Focused Feasibility Study

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Focused Feasibility Study Report and Proposed Plan for OU2 wer
public in
June 1994. Both of these documents are available in the Administrative
information
repositories maintained at the Harford County Library - Aberdeen, MD; Ha

Library - Edgewood Branch, Edgewood, MD; Washington College - Miller Lib
Chestertown, MD; and,
Essex Community College Library, Baltimore, MD. The notice of availabil
documents was
published in the Aegis (Harford County) on June 22,1994; the Baltimore S
1994; the
Avenue (Baltimore County) on June 30, 1994; and the Kent County News on
1994.

The 45-day comment period was extended an additional 30 daya based
request. This
75-day public comment period was held from June 22, 1994 through Septemb
In addition, a
public meeting was held on July 14, 1994. At this meeting, representati
EPA and MDE
presented a summary of the site conditions and remedial alternatives und
A response
to the comments received during this period is included in the Responsiv
which is part
of this Record of Decision.

This decision document presents the selected remedial action for O
O-Field area,
Aberdeen Proving Ground, Maryland. The remedy has been chosen in accord
CERCLA, as
amended by SARA, and, to the extent practicable, the National Contingenc
addition, this
decision incorporates the findings of the FFS, which evaluated the remed
OU2. The
decision for this operable unit is based on the Administrative Record.

4.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

Past disposal operations at the Old O-Field area has led to contam
groundwater
at and near Old O-Field. The Army has decided to manage the environmental
in the
different media at the Old O-Field area in a phased approach. This separat
environmental media
into Operable Units allows the U.S. Army to begin remediation prior to full
O-Field area.
Section 300.430(a)(1)(ii)(A) of the NCP, 40 CFR 430(a)(1)(ii)(A), provides
NPL sites
"should
generally be remediated in operable units when early actions are necessary
achieve
significant risk reduction quickly, when phased analysis or response is nec
appropriate given
the site or complexity of the site, or to expedite the completion of a tota
Army's phased

approach to O-Field is consistent with these objectives.

An Operable Unit (OU) is defined by the National Oil and Hazardous Pollution Contingency Plan (40 CFR 300.5) as a discrete action which is an incrementa comprehen-sively mitigating site problems. The Operable Units for the O-Field area a defined as follows:

OU1: Contaminated groundwater beneath and immediately downgradien O-Field disposal trenches which has been contaminated from past dispo

OU2: Contaminant source area within the trenches at Old O-Field

OU3: Contaminated surface water and sediment within Watson Creek;

OU4: Contaminated soil and groundwater at New O-Field.

The Army has already selected a remedy for OU1. The contaminated gro potential threat at this site because of the high levels of solvents and chemical age products detected in groundwater samples collected downgradient of Old O-Field. Low explosives compounds and toxic metals have also been detected in downgradient groundwa project is in the construction phase and startup and operation of the groundwater extract system is scheduled to begin in December, 1994. OU3 and OU4 require additional in and will be handled in separate actions.

This remedy for OU2 addresses the principal threat posed by the site, potential for an accidental release of CWM into the air. The function of this operable u risk of an accidental release of CWM from the site by minimizing the possibility of a reducing the likelihood and effects of an unplanned detonation of ordnance, and minimizi likelihood and the potential effects of evaporative release of CWM from a surface or su primary CWM at the site are believed to be mustard, phosgene, lewisite, and white ph

Access to the Old O-Field area is currently restricted by a number countermeasures. Institutional controls are in place to preclude the po trespassers and residential or industrial use of the area.

This interim remedial action will eliminate surface soil exposure Old O-Field area and reduce the threat of a catastrophic event due to an explosion a release.

It will also allow for continued study and testing of approaches to redu the toxic contaminants at the site. The final remedy will be selected after an ap is identified or developed. The interim action will be consistent with future actions

5.0 SUMMARY OF SITE CHARACTERISTICS

This section provides a summary of the nature and extent of contam O-Field, a discussion of potential routes of contaminant migration and routes of ex population and environmental areas that could be affected by a release at the site, and that may affect remedial actions at the site.

5.1 CONTAMINANTS AT OLD O-FIELD

The available historical records concerning disposal and recovery O-Field have been evaluated to identify the types and quantities of chemical agents e place at Old O-Field. This information has been supplemented with data regarding the r agents contained in ordnance during the time period in which disposal took plac

Based on available historical information regarding disposal activ is likely that mustard is the predominant CWM at Old O-Field (Yon. 1994). Mustard was widely-deployed chemical agent during World War II, and historical records indicate that disposed at Old O-Field both in ordnance and in bulk quantities. Phosgene (a choking agen commonly used, and historical records verify its disposal at Old O-Field. The disposal of and adamsite (a vomiting agent) at Old O-Field has also been documented.

There are no data to indicate that nerve agent-filled ordnance wer O-Field. However, this does not rule out the possibility that nerve agents were d O-Field in lab containers or other non-ordnance containers. Organophosphorus compounds detected in groundwater downgradient of Old O-Field, indicating the presence of nerv materials; this may be due to dispose of waste sludge from a pilot plane, disposal of ne simulants, or the disposal of nerve agents. It is considered likely that the number of ne

containers at Old
O-Fieid is very small because these items were produced at the Edgewood field testing, and
items which did not function in testing were routinely destroyed in plac

In addition to the above, it is believed that white phosphorus exi in
ordnance and other containers. Because white phosphorus spontaneously i when
exposed to air, the presence of white phosphorus leads to an elavated ri fire at Old O-
Field, which may result in detonation or other types of release.

The primary non-CWM chemicals disposed or used at Old O-Field incl (principally
1,1,2,2-tetrachloroethane), lime, and fuel oil used in decontaminating a

5.2 POTENTIAL ROUTES OF CONTAMINANT MIGRATION AND ROUTES OF EXPOSURE

The analysis of groundwater samples collected from monitoring well Old O-Field
indicate that high levels of chemical agent degradation products and VOC locations.
Lower levels of explosives compounds and toxic metals have also been det downgradient
groundwater. These results imply that the buried containers are leaking contaminants are
percolating to the water table and migrating in groundwater toward Watso

The construction and operation of the groundwater extraction and t part of
the OU1 remedy) will eliminate this pathway of contaminant transport by contaminated
groundwater, treating it, and discharging the treated groundwater to the

The types of CWM disposed at Old O-Field hydrolyze readily when in water, and the
hydrolysis products are far less toxic than the original compounds. The of CWM from
Old O-Field into the groundwater presents no threat to human health.

The potential route of contaminant migration that poses the princi health and
the environment is an air release of CWM resulting from fire, accidental de ordnance, or
evaporative release.

5.3 POPULATION AND ENVIRONMENTAL AREAS THAT COULD BE AFFECTED BY THE

CONTAMINANTS AT THE SITE

The construction of the Operable Unit 1 (OU1) groundwater extraction system is presently underway, so workers are located at Firing Position 5 (immedia Old O-Field). After construction is complete, full-time operators will be present at F operate the treatment plant. These personnel will be within 100 yards of Old O-Fiel

In addition, workers are present at H-Field (south of New O-Field) of Old O-Field). These workers are within 1/2 mile of Old O-Field. Large number military personnel work on the northern Gunpowder Neck and in the industrial areas of the E which is within 2 miles of Old O-Field.

The residential areas closest to Old O-Field lie approximately 2.7 (on-post military housing within the Edgewood Area of APG), 3 miles to the west (Maryland) and 4.5 miles to the north-northwest (Edgewood, Maryland, and Joppatowne, Ma addition, Kent County, Maryland, lies 6 miles west of Old O-Field.

5.4 SITE-SPECIFIC FACTORS THAT MAY AFFECT REMEDIAL ACTIONS AT THE SITE

The existence of both live ordnance and CWM at Old O-Field present and security concerns. The protection of site workers and the community is of primary i action.

Ordnance may be shock- or pressure-sensitive, so actions that invo ordnance and direct contact with the field must be minimized and carefully planned acitivities present the risk of accidental detonation and/or evaporative release of CW

White phosphorus is known to be present within Old O-Field. White burn if exposed to air. Therefore, clearing and grubbing of the Old O-Fie minimized.

Because the disposal and recovery activities have resulted in the underground pits and trenches which may overlap, the surface soil at Old O-Field is susceptible to collapse. Trench collapse could result in the shearing or punctur bulk containers, and potential release of CWM. To prevent this, the we O-Field should be minimized and controlled to the extent possible.

6.0 SUMMARY OF SITE RISKS

This section contains an evaluation of human health and environmen associated with contamnination in the Old O-Field source area. The Old O-Field source a challenge to risk-based decision making because of the unconventional hazards at the site. be quantified by standard risk assessment techniques. Nonetheless, the existence of a large variety of unexploded ordnance items, CWM in ordnance and bulk containers, and o (contaminated equipment and lab samples) pose potential risks to human health and the

The hazard posed by a situation consists of a combination of the p occurring and the effects of that event, as follows:

Hazard = Probability X Effect

In other words, it an event, is not likely to occur (small probability) are very large, then that event may still dominate the total risk posed by the site. In following information is presented and evaluated:

Potential explosive risks associated with unexploded ordnance;

Potential risks posed by the CWM;

Summary of risks.

6.1 EVALUATION OF EXPLOSIVE HAZARD AT OLD O-FIELD

The expected frequency and magnitude of a potential explosive even this section. An explosive event consists of the unplanned detonation or burning of an key factors that may lead to an explosive event are shock/pressure, condition of the expl effects, and time.

The historical data concerning Old O-Field include documentation o explo-sive/thermal events. In addition, it is likely that a number of undocum occurred, and the explosive reaction of a small item of ordnance may go unnoticed. Ho available data and judgment concerning the stability of the field, it has been estimate frequency of explosive events at Old O-Field is 1 to 3 events per ten-year period (AP

6.2 EVALUATION OF CWM HAZARD AT OLD O-FIELD

Historical data regarding disposal and recovery activities at Old
evaluated to
assess the relative amounts of CWM currently within Old O-Field. Becaus
be incomplete
quantitative estimates cannot be derived with total accuracy. However,
O-Field historical
records and the Army records on testing and use of CWM-filled munitions,
estimates on the
relative amounts of CWM at Old O-Field have been made:

Approximately 90% of the CWM-filled ordnance and bulk contain
O-Field may
contain mustard;

Between 5 to 10% of the remainder of the CWM-filled ordnance
containers may
contain phosgene;

The remainder of CWM-filled ordnance and bulk containers may
and other
materials. These other materials may include cyanogen chlori
adamsite.

A conservative estimate for the potential number of nerve age
0.3%
of the total number of ordnance items.

The majority of ordnance items have been buried for more than 40 years.

6.3 RISKS ASSOCIATED WITH ACUTE EXPOSURES TO CHEMICAL AGENTS RELEASED AS A RESULT OF AN EXPLOSION OR SPILL

The history of Old O-Field indicates that explosions and fires h
past. The
nature of the site indicates that, in the absence of site remediation, i
explosions of fires may
occur in the future. Furthermore, the potentional presence of CWM in or
containers poses
the possible hazard of a release of chemical agents to the atmosphere wi
airborne migration
to nearby areas.

Because of the large number of uncertainties concerning the quantity,
location of
ordnance within Old O-Field, definitive statements regarding the effect

explosions would
have on human health and the environment cannot be made. However, a qua
assessment of the
CWM hazards posed by the field in the event of a fire or explosive relea

If a release occurs, individuals working at the nearby fields (H-F
O-Field)
would be the most likely receptors. However, human populations in areas
relatively remote
to Old O-Field could potentially be exposed to a vapor cloud. These pop
the following:

- Workers on the Gunpowder Neck and nearby ranges;

- Personnel working within the industrial areas of Edgewood Are
troops
housed at Edgewood Area;

- People involved in commercial or recreational fishing or boat
Gunpowder River or Upper Chesapeake Bay; and

- People living off-post near Graces Quarters and the towns of
Magnolia.

The magnitude and duration of exposures depend on the specific s
of release,
amount of agent released, type of agent, wind speed and direction, and w
However,
even under worst-case weather conditions, the effects of a release at Ol
most likely not
be detected in areas beyond H-Field and M-Field. The more remote off-si
would not be
affected by an explosion or fire event at Old O-Field unless a large qua
rounds detonate
under stable weather conditions, which is highly unlikely.

Even though the likelihood that an explosion or fire would cause a
effects
in off-site communities is small, the hazards posed to on-site workers a
may be
siginificant.

6.4 SUMMARY OF HAZARDS POSED BY OLD O-FIELD

The contaminant transport pathway that poses the highest risk to h
environment consists of a release of CWM as the result of fire or explos
probability of such an
event is low but not insignificant, and the history of Old O-Field inclu
unplanned explosion
and fire events. In addition, the potential results of a catastrophic e

magnitude
that the possible consequences must be addressed.

The presence of both CWM and ordnance presents the possibility of ensuing
disperse of toxic chemicals into the atmosphere. This possibility poses populations
and ecosystems. From numerous discussions with experts knowledgeable ab condition of Old O-
Field, the following are potential causes of an explosion at Old O-Field

Fire. The exposed rounds on the surface and/or rounds which surface may
detonate if subjected to fire. Because Old O-Field is heavil substantial
amount of organic detritus on the ground, it is expected that vigorously and
that a fire started on any side could consume the field. Alt surrounded by a
road, the gap (approximately 12 feet on the north, east, and enough to
stop a brush fire. The proximity of Old O-Field to H-Field, combat tracked
vehicles occurs and where brush fires occasionally are starte the
possibilily of a fire. The recent addition of a narrow acces of the
existing road most likely will not significantly reduce the s many places,
there is no gap between the branches of trees on opposite sid addition to the
possibility that a fire may start outside the field, it is al start inside the
field. This is due to the presence of white phosphorus and o materials. When
exposed to air (e.g., during trench collapse or soil shifting spontaneously
ignite. Recent observations suggest that items continue to b erosion, frost
heave, or other mechanisms. The most likely stimulus for exp rupture would be
from fires.

Shock or pressure. Fuzes and initiating devices are far more pressure
than high explosives. The stockpile configuration of many or a burster and
point-detonation fuze. While most of these fuzes would be un that a small
number of items in Old O-Field have been armed by forces such detonations. Any
item with an armed fuze would be very hazardous and sensitive pressure. In
addition; LTC Dickey reported that some of the Japanese munit

disposed at Old O-
Field used picric acid as bursters. When the picric acid det
salts, they are
shock sensitive. LTC Dickey also reported that there were ma
with fuzes; one
was accidentally dropped and detonated as a reault of the sho
the ground.

Ordnance Exposure. The processes of erosion, corrosion, and
resulted in
the formation of voids and the structural weakening of portio
volume. With
continual action of these processes, there will be collapse o
set-
tling/consolidation of wastes. Erosional holes to the surfac
white
phosphorus ordnance to oxygen and providing a pathway for CWM
It is also
possible that movement of wastes and soil may result in impac
crushing of the
buried items, which may result in release of CWM from corrosion-wea
which
could initiate detonation of ordnance items that are sensitive; how
source is less
likely than the thermal ignition hazard. The other possible causes
at the
surface are the following:

Honeycombing of trenches. The historical aerial photographs
available
space became more scarce at Old O-Field, the trenches began to ove
result in very unstable soil conditions.

Density differences. The difference in densities between som
and
soil sometimes allows munitions to work their way up through the s
eventual exposure to the atmosphere.

Presence of animals. If animals are burrowing through the so
run
on top of the filled trenches, their movement my cause the soil to

Frost/thaw cycles may aid in trench erosion and the mobilizat
munitions to the surface.

Time. The historical records indicate that numerous surface
have
taken place at Old O-Field. However, as documented by the recent
Old
O-Field (Section 2.3), a number of ordnance items are now exposed

the
site due to erosion and trench collapse. As more items become exp
threat of white phosphorus-initiated fire and the possible consequ
initiated
by any source may be heightened.

Actual or threatened releases of hazardous substances from this site, if
implementing the response action selected in this ROD, may present an imminent
substantial
endangerment to public health, welfare, or the environment.

7.0 DESCRIPTION OF ALTERNATIVES

During the technology screening conducted as part of the Focused F
(APG,
1994b), applicable remedial technologies were identified, evaluated, and
remedial
alternatives. These remedial alternatives address the following general

- No Action;
- Limited Action;
- Containment (two alternatives); and
- Permeable Infiltration Unit (PIU).

This section describes the alternatives that were considered for remedia

7.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

As required by the NCP, the selected alternative must be in compli
applicable or
relevant and aproprìate requirements (ARARs). ARAR are the cleanup stan
standards of control,
and other substantive environmental requirements, criteria, or limitatio
under Federal or
State law that specifically addresses a hazardous substance, pollutant c
action,
location, or other circumstance of a Superfund site.

Chemical-specific ARARs include State of Maryland standards for ai
hazardous
substances, including some substances which can potentially be emitted f
The State of
Maryland also has requirements for particulate emissions in air and the
and inorganic
analytes to surface water.

Capping involves covering a site to reduce direct human and animal
contaminants
and to minimize infiltration of precipitation and subsequent vertical mi
State

regulations set standards for cap requirements when a landfill is perman standards would apply to any final remedy in which buried materials are allowed to but would not apply to an interim remedy.

7.2 ALTERNATIVE A: NO ACTION

Under this alternative, no action would be taken to address the so at Old O-Field. The No Action alternative is intended to serve as a baseline w compare the risk reduction effectiveness of the other alternatives that are under considerat maintenance of existing institutional controls (access restricted by the existing fence institutional controls) are not assumed under this alternative. The land-use conditio No Action scenario includes unrestricted land use. Because Old O-Field contains m agents, chemicals associated with decontamination activities, and other hazardou risks associated with the unrestricted land use scenario is unacceptably high. Over a lo the chemical concentrations in the soil may decline due to natural biodegradation, hy leaching, but the site will still pose risks due to UXO and chemical contamination.

The No Action alternative would not involve active treatment or co Therefore, there would be no reduction in toxicity, mobility, or volume of contaminants a There would be no implementation time or cost associated with the No Action alternative be additional remedial activities would be implemented at the site. Because of the likelihoo release of CWM or other air pollutants, this alternative would not comply with chemic

7.3 ALTERNATIVE B: LIMITED ACTION

The Limited Action alternative would continue the current restri would include implementation of the following actions:

- Institutional restrictions;
- Maintenance of existing physical security countermeasures;
- Public education programs; and
- Continued monitoring of site conditions and five-year reviews

Institutional controls include access restrictions, deed restricti restrictions. Access restrictions include long-term maintenance of the existing fence supplemental physical security countermeasures, and regulations and enforecement to p trespassing. Deed and land use restrictions would limit the future uses at the site and requir supervision, and health and safety precautions for any activities conducted near Old O-Fi programs would be developed to inform workers and local residents of the potential site reviews would required by the NCP at all sites where hazardous chemicals remain untreated would analyze available monitoring data to make a determination as to whether remedial actions or site controls would be required.

This alternative would provide a minimal reduction in human health risks posed by the baseline conditions (No Action) by limiting future use and develo affected area through written regulations. Limited Action would include no further actions to the source, or to reduce migration. This alternative would be protective of human heal environment only under undistributed site conditions. However, this alternative would not redu or explosive event and would not be protective in the case of a fire or explosive event wit release of CWM.

The Limited Action alternative would not involve active treatment Therefore, there would be no reduction in toxicity, mobility, or volume of contaminants a Because of the likelihood of an eventual air release of CWM or other air pollutants, th not comply with chemical-specific ARARs.

Because no measures to treat or contain the contaminated soil woul risks would not be reduced beyond the current risks posed by the site. Howeve concentrations in the soil may be reduced over many years by natural degradation mechan continued operation of the grounwater treatment system. The institutional control alternative would not as effective as active engineering controls because these cont ignored by individuals unfamiliar with them; however, continued maintenance of the system and warning signs may provide effective long-term control of human contact contaminants and the

surface of the field. Although this alternative would prevent direct co
would not
mitigate potential impacts of air releases from the site. Because air r
possibility, the long-
term effectiveness of the Limited Action alternative is uncertain.

Aside from the natural attenuation discussed above, there would be
in the
toxicity, mobility, or volume of the contaminant souce at Old O-Field be
and/or treatment
of contaminated materials are not components of this alternative. Mobility
in bulk or in
soil at Old O-Field is uncertain and uncontrolled under this alternative.
remain for

spontaneous white phosphorus ignition or UXO detonation with resulting r
contaminants from
the site.

In addition, because the surface of Old O-Field would not be cover
Action
alternative, animal intrusion may occur with the potential for the colla
exposure of
white phosphorus.

Most components of Alternative B have been implemented and are bei
the site.
Institutional controls and other provisions of this alternative would li
minimizing short-
term risks. However, given the unpredictable nature of the site, and it
spontaneous
detonations, this is not certain. Exposures to airborne contaminants co
detonation
or fire at the site.

All components of Alternative B are feasible and easily implemente
equipment
and materials required for implementation of this alternative are readil
Administrative
implementation of this alternative would require coordination between AP
Maryland, and
the EPA to ensure continuity of the long-term management and monitoring

The cost estimate for this alternative for this alternative is bas
groundwater and
surface
water monitoring at O-Field will be performed as part of the OU1 groundw
and the
ongoing RI for O-Field. Capital costs are estimated to be $690,000, and
costs are $180,000.

Total present worth costs for this alternative based on a 30 year (5% di implementation period are $2,168,000. Maintenance of the existing fence system is included in operating cost for this alternative. Contingencies associated with the alternative would be min alternative does not include any treatment or design components. Costs could be affected periodic groundwater or surface water monitoring is included in this alternative.

7.4 ALTERNATIVE C: PERMEABLE INFILTRATION UNIT (PIU)

Under this alternative, the surface of Old O-Field would be overlain would reduce releases due to fires or explosions, but would be permeable to wa would be designed to allow filtration of water or the application of solutions th allowing further testing of processes to treat the soil and wastes. This alterna conjunction with the downgradient groundwater treatment system to promote leaching of con produce an ultimate reduction in the volume of the wastes.

The PIU would be constructed using sand or other granular material from vapor emission caused by fire or explosions, and to act as a barrier bet wastes, and contaminated soil and the surface environment. A permeable layer of mod would attenuate the effects from exploding munitions and reduce CWM emissions from the b trenches. In addition, the layer would tend to flow and fill in gaps if an explosion occurs, so repair of the PIU would be simpler than repair of other types of covers. materials would be insulated from the effects of surface fires by the sand or other granula addition, the possibility that exposed white phosphorus would serve as an ignition sou reduced by isolating the wastes from air contact.

Sand or other mineral-based granular materials would provide resis fire/explosive releases, and the layer design would include erosion control layers to prevent win erosion. The permeable structure would not lower the water table and would keep the s which would reduce the possibility of igniting buried white phosphorus.

Other components of this alternative include:

An air monitoring system would be installed within the PIU to dete
CWM within
the pore space. of the sand

A sprinkler system would be constructed on top of the PIU that wou
quickly
spraying water or other solutions on the PIU. If a CWM release is
monitoring
system, then the sprinkler system would be activated. The water s
would
form a vapor barrier within the sand to prevent an air release of
hasten the
hydrolysis of CWM.

Treatability studies would be performed using the sprinkler system
other
solutions to the PIU. The results of these studies would be used
feasibility of
enhanced leaching of the contaminants from soil and buried contain
groundwater. In
addition, the surface of the PIU would be monitored to evaluate th
of Old O-
Field.

The ability of the groundwater extraction and treatment system tha
construction for OU1
(contaminated groundwater emanating from Old O-Field) to capture a
contaminated
groundwater emanating from Old O-Field would be verified. In addi
effectiveness of the
groundwater monitoring program to detect changes in the site hydro
groundwater
chemistry would be verified.

The chemical-specific ARARs that apply to this remedial action are
criteria and air
pollution standards. The quality of surface water in Watson Creek and
River would be
protected during the construction of this alternative by implementing
controls and sediment
and erosion control measures. Airborne emission of particulates during
constuction would be
managed by controlling the moisture content of the sand and gravel. How
be a potential
for releases of chemical agents and other contaminants from Old O-Field
implementation.
Although all pertinent air monitoring requirements would be met and all
preventing such

releases would be taken, the unpredictable nature of the site does not a estimating effects of placing the PIU on Old O-Field.

The PIU would comply with ARARs after implementation. Runoff and the site would be controlled, thereby protecting nearby surface water quality. ARARs g atmospheric release of contaminants (especially agents) would be met through the use of an inte system combined with emergency response capability (i.e., the sprinkler system) minimize potential agent releases to the atmosphere.

Implementation of this option would take approximately 12 to 18 mo phase and approximately 24 months for the construction phase. These time estimate regulatory review of the design.

The total capital costs for installation of the PIU (assuming cons estimated at $11,041.000. The total annual costs are estimated at $269,000, and t worth of these costs, calculated with a 5% discount rate over a lifetime of 30 years, i Earthen materials, such as sand and gravel, are expected to be brought on site rather than elsewhere at APG.

7.5 ALTERNATIVE D: FOAM CAP

This alternative would stabilize the soil and prevent human and an munitions and contaminated material buried in the disposal pits at Old O-Field by cove spray on foam, such as a polymerizing urethane foam. A polysulfide coating could be sp surface of the foam to prevent degradation of the foam by sunlight. The low density of result in a relatively small amount of pressure on the trenches and buried items. T would allow foot traffic and light equipment with minimal pressure applied to the buried remedy could be accomplished remotely, without excavation or soil compaction, thereby mi exposure of workers to the field and the disturbance of the surface and subsurface soil. In would prevent air from reaching the buried materials, thus reducing the fire h ignition of incendiary materials, such as white phosphorus. The principal drawback that it would provide little shrapnel resistance in the event of a detonation; however accidental explosion or fire occurring is minimized by this alternative.

This alternative would not by itself provide complete protection of environment. A foam cup would prevent vertical infiltration of water th contaminated soil and reduce release of vapors to the atmosphere. It is expected that this re reduce, but not eliminate, the mass loading of contaminants into the aquifer. The f reduce the risks of atmospheric releases of contaminants from the surface of Old O-Field soil, preventing human and animal access to the field, preventing air contact with the so infiltration of stormwater through the contaminated soil. In addition, the cap would be lightweight material which would reduce the risk of trench and/or thin-walled shell

Other components of the foam cap alternative would include:

Air monitoring within the foam/soil interface; and

Stormwater runoff control.

Implementation of this remedy would prevent the release of CWM and contaminants to the atmosphere because of the low gas permeability of the cap material, exce detonation. In this event, containment of the detonation and contaminant vapors woul because of the likelihood that the foam cover would be breached. The risk, however, of detonation of the munitions would be reduced because the surface soil of the soil of the f stabilized and the flow of oxygen to the surface of the field would be cut off. The risk of fire a be reduced, but the effects of a subsurface detonation are unknown. Construction and di would result in the release of VOCs to the atmosphere.

The chemical-specific ARARs that apply to this remedial action are criteria and air pollution standards. The quality of surface water in Watson Creek and the would be protected during the implementation of this alternative by proper runoff implementation of sediment and erosion control measures. Although all pertinent air monit would be met and all measures for preventing air releases would be taken, the unpredi site does not allow certainties in estimating effects of placing a cap on Old O-Field.

safely constructed,
it would ensure compliance with air quality ARARs by providing an imperm boundary to vapor
transport from the current surface of Old O-Field, and prevent any conta runoff to nearby
surface water.

If properly maintained, this option would provide long-term soil s reduction of
contaminant mobility. Maintenance would consist of inspecting and perio the foam layer,

maintaining the perimeter fence system, and continued use of the groundw and treatment
facility.

Implementation of this option would take approximately 12 to 18 mo phase and
48 months for the construction phase.

For the installation of the foam cap, the costs were estimated con remotely
operated, robotic equipment. The total capital costs are estimated to b the total annual
costs are estimated at $275,000. With a 5% discount rate, the present w and annual
costs is $22,647,000.

7.6 ALTERNATIVE E: MULTI-MEDIA CAP

This remedy would consist of the construction of a multi-media cap to of Old
O-Field. The highly-engineered cap structure would consist of several l stone, synthetic
fabric sheets, a clay liner, a drainage layer, low-permeability soil fil vegetation.
Construction of this cap would stabilize the soil and trenches; prevent infiltration through the
source area; eliminate human and animal contact with the surface of the possibility of
a fire by cutting off oxygen to the current field surface; and reduce th potential effects of
accidental detonation and evaporative release. To reduce the overall we combination
of natural and synthetic materials may be used in cap construction. Con would also
be tailored to minimize the disturbance of the field, although soil comp needed to form
the upper topsoil layer.

Other components of the multi-media cap alternative include:

An air monitoring system within the foundation layer; and

Stormwater runoff control and drainage control;

The relatively large weight of this cap would pose a safety concer
instability of
the trenches and the presence of thin-walled munitions and containers wi
is possible that
cap construction would cause collapse of trenches or buried drums within
event, should
it occur, could possibly result in shell rupture and release of its cont
triggering
of a pressure-sensitive fuse and detonation of the round. The use of he
equipment on
the field may compound this risk. However, if the cap can be constructe
incident, then it
should be capable of providing the desired protection.

The chemical-specific ARARs that apply to this remedial action are
criteria and air
pollution standards. The quality of surface water in Watson Creek and t
River would be
protected during the implementation of this alternative by proper runoff
implementation of
sediment and erosion control measures. The air emission of particulates
construction would
be managed by controlling the moisture content of the multi-media cap co
materials. However,
potential releases of chemical agents and other contaminants from Old O-
implementation may
not be prevented. Although all pertinent air monitoring requirements wo
measures for
preventing such releases will be taken, the unpredictable nature of the
certainties in
estimating the potential releases and effects of constructing a multi-me
O-Field. Agent
releases to air would be controlled except in the case of detonation or
the cap is
breached.

If properly maintained, this option would provide long-term soil s
reduction of
contaminant mobility. Maintenance would consist of mowing and repairing
maintaining the
existing fence system, and continued use of the groundwater extraction a
facility.
Additionally, subsidence caused by settlements in the landfill would be
impermeable

layers of the cap are breached by ground motions caused by subsidence, t
require repair.
In this case contaminants may be released to the air. Effective repair
would subject
workers to additional risks.

Implementation of this option would take approximately 12 to 18 mo
phase and
24 months for the construction phase.

If the cap is completed, additional actions, such as maintaining e
periodic
maintenance of the vegetative cover, would not be difficult to implement
repairing the multiple
layers may be difficult if the cap is breached by subsidence or detonati
monitoring and
maintenance would include visual inspection of the entire cap to ensure
erosion
controls are functioning properly. Growth of grasses and other vegetati
of the cap
must be controlled to prevent deep root growth, which could compromise t
effectiveness.

The total capital cost for installation of the cap, assuming const
estimated at
$11,215.000. The total annual O & M costs are estimated at $460,000. T
worth of capital
and annual O & M costs are estimated at $18,285,000, calculated over 30
discount rate of 5%.
Earthen materials, such as sand and gravel, are expected to be brought o
borrowed from
elsewhere at APG.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the alternatives descr
with
respect to nine criteria used to assess remedial alternatives as outline
of the NCP.
Each of the nine criteria are briefly described below. All of the alt
evaluated for their ability
to meet the threshold criteria of protection of human health and the e
compliance with
ARARs. The alternatives meet the other criteria to varying degrees.
and assessing
relative strengths and weaknesses of the remedial alternatives, this s
comparative
analysis of alternatives. As previously discussed, the alternatives a

Alternative A, No Action

Alternative B, Limited Action
Alternative C, Permeable Infiltration Unit
Alternative D, Construction of Foam Cap
Alternative E, Construction of Multi-Media Cap

These five alternatives are compared to highlight the differences betw and to identify trade-offs in meeting the criteria.

8.1 NINE EVALUATION CRITERIA

Section 300.430(e) of the NCP lists nine criteria by which each must be assessed. The acceptability or performance of each alternative agains evaluated individually so that relative strengths and weaknesses may be identifi

The detailed criteria are briefly defined as follows:

Overall Protection of Huamn Health and the Environment is used a remedy provides adequate protection against harmful effect human health or environmental risks are eliminated, reduced, or co treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether a remedy will meet a applicable or relevant and appropriate requirements of Federal and State e or provides a basis for invoking a waiver.

Long-term Effectiveness and Performance refers to the magnit and the ability of a remedy to maintain reliable protection of h environment, over time, once clean-up goals have been met.

Reduction of Toxcity, Mobility, or Volume through Treatment performance of the remedial actions as employed for each alt

Short-term Effectiveness refers to the speed with which the protection, as well as the remedy's potential to create adverse impacts environment that may result during the construction and impl

Implementability is the technical and administrative feasibi including the availability of materials and services needed to implement t

Cost includes both capital and operation and maintenance cos

State Acceptance indicates whether, based on its review of t Proposed Plan, the State concurs with, opposes, or has no comment on alternative.

Community Acceptance assesses the public comments received on t and the Proposed Plan for the Operable Unit.

The NCP (Section 300.430(f)) states that the first two criteria, p health and the environment and compliance with ARARs, are the "threshold criteria" whic by the selected remedial action. The next five criteria are the "primary balancing crit trade-offs within this group must be weighed. The preferred alternative is that alternative wh human health and the environment, is ARAR-compliant, and provides the best combinatio balancing criteria attributes. The final two criteria, state and community acceptance, are which are evaluated following comments from the FS report and the Proposed Plan.

8.2 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative A, No Action, would allow for unrestricted future land alternative, no actions would be taken to eliminate, reduce, or control exposures to haz and contaminants. An unacceptably high level of risk would result. The thr protection of human health and the environment would not be achieved by Alternative A.

Alternative B, Limited Action, would provide some protection from hazards at the site by maintaining a high level of physical security. These action limit site access and direct exposures. Alternative B would pose no additional risks duri because no additional construction activities would be undertaken at the site. How would not prevent future releases due to fires, explosions, or even slow leakage f containers. Alternative B would result in unacceptable human health and environmental risks to s surrounding populations if a release occurs. Therefore, Limited Action would not me criterion of protection of human health and the environment.

Implementation of Alternative C, Alternative D or Alternative E wo potential for release of vapors (CWM and other volatile contaminants) to the atmospher alternatives would prevent direct human and animal contact with Old O-Field, and redu contaminants in windblown dust or surface runoff. Alternatives D and E would make us non-flammable or flame- retardant materials and would cut off oxygen to the field, which would d probability of fires. Alternative C would reduce the probability of fires by minimizing the ox burnable materials and by maintaining a moist subsurface environment. Under all three of t the risk of spontaneous ignition, as well as the effects of a fire, would be reduced surface would also be reduced. These alternatives would result in some short-term ris construction, but these risks could be minimized and controlled by selection of proper construct during the concept design phase. The overall long-term risks would be reduced. Both the e and the treatment system would be evaluated to ensure overall compliance with th treatment goals.

Alternatives D and E include impermeable cover layers and would pr infiltration of water through the contaminated soil. Either of these capping remedies w reduce leaching and reduce the transport of contaminants into the aquifer. However, the covers would lower the water table beneath the field and could potentially interfere with o groundwater extraction system.

Alternative C, the permeable infiltration unit, would enhance degr of the wastes. Short-term risks during construction could be controlled by pro application

methods during the concept design phase. The permeable layer would stab surface of the field and offer increased protection against fires and explosions. infiltration of precipitation and additional water provided by a sprinkler system. Saturat permeable layer would reduce CWM vapor emissions. Treatment processes could be tested by addi reagents to the applied water. Continued or accelerated leaching of contaminants would leachate would be collected by the groundwater extraction and treatment system. Althou greater flow into the extraction system would be expected, the groundwater treatment plant with the reserve

capacity and backup systems to handle the greater flows and potentially
concentrations of
contaminants.

The self-healing properties of the sand is an advantage of Alterna
Alternatives D and
E. Both Alternatives C and D would allow easier repair compared to Alte

In addition, construction of Alternative C would allow greater fle
remedial action
by allowing for treatability studies to evaluate enhanced degradation of
studies would
be difficult or impossible under Alternatives D and E. Alternative C al
monitoring and evaluation
of the rate of subsidence of the landfill.

Alternative D, the impermeable foam cap, would provide some protec
health and
and the environment, but would not provide the same level of protection
releases as
Alternatives C or E. Construction of this cap would have relatively low
from explosive
hazards because it can be remotely installed. However, construction of
release
ozone-depleting fluorocarbons and other air pollutants. The foam cap wo
vapors released by
leakage of wastes within the disposal site, but would offer little prote
expolosive event below
the cap or a large fire.

Alternative E, an impermeable multi-media cap, would provide blast
to that
provided by Alternative C. Alternative E would contain vapors and reduc
and severity of
fires and explosions. However, construction of a multi-media cap would
short-term risks than
Alternative C because it would require compaction of materials on Old O-
multi-media cap also
would be more difficult to repair because of the more complex structure.
alternative provides
protection of human health and the environment, but to a lesser degree t

8.3 COMPLIANCE WITH ARARS

Compliance with ARARs is a threshold criterion which must be met b
remedial
action. Alternatives A and B (No Action and Limited Action scenarios) d
criterion because
releases due to fires or explosions, with resulting air releases, would

The three remaining alternatives are capable of meeting ARARs. Th
surface
water would be protected by proper runoff control and implementation of
erosion control

measures. The emission of particulates during construction would be man
controlling the
moisture content of earthen materials that are placed for Alternatives C
VOCs during
foam application would be a concern for Alternative D, and will be manag
the amount
of spraying per day. Alternatives D and E would meet all applicable req
impermeable covers
at closed hazardous waste landfills. This ARAR does not apply to Altern
is an interim
action to minimize air releases and explosive hazards at the site and is

8.4 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives A and B would not provide long-term effectiveness and
No Action
alternative provides minimal protection of human health and the environm
Action
alternative provides some protection through continuous control of human
source area.
However, United Action would not stabilize the field, and the possibilit
fire/explosion would
continue, because the field would remain in an unstabilized and uncontro

Alternatives C, D, and E provide varying degrees of long-term effe
permanence.
These alternatives would assist in preventing an explosive event, and al
control the adverse
effects if a fire or explosion occurs. Each of these alternatives would
surface of Old
O-Field and provide a more stable working surface for future investigati
actions. The
layers placed over the field surface would minimize the risks of fire fr
from exposed
white phosphorus. Each alternative would curtail the supply of oxygen t
reducing the
possibility of white phosphorus ignition. Alternative C also would main
subsurface
environment, which would further reduce the chances of white phosphorus

Alternative C would provide the best long-term effectiveness in st
conditions and
reducing the probability of a fire or explosion. This option would prov
stabilization of the field
surface than the cap alternatives. Because Alternative C would use gran
cover,
breaches caused by trench settlements or collapses would be largely self
repaired.
Once settlement has stabilized, the permeable layer could become the bas
cover or

cap. Alternative C (foam cap) would place the lowest loading on the fie
stabilize the surface.
Both the foam cap and the multi-media cap may fail if large settlements
although the
foam cap would be easier to repair. If settlement occurs and the multi-
damaged, repair of
the multi-media cap would be very difficult.

If a significant explosion occurs, Alternative C would provide the
effectiveness and
permanence. The sand used in Alternative C would better absorb explosiv
rigid
materials used in Alternatives D and E. For Alternative E, explosions c
damage the layers
of this cap, destroying its effectiveness in preventing air releases. R
be very
difficult because of the complex layering system and the specialized mat
Alternative D would
be ineffective in containing releases caused by explosions. The foam wi
the event of a
large fire or explosion, potentially destroying major portions of the ca
damaged areas
would be a relatively simple process, but large breaches will be more di

Overall, Alternative C results in the best long-term effectiveness
alternatives.
The permeable system would promote degradation of the wastes, and would
the
groundwater treatment system. The permeable structure would be easier t
the cap
alternatives, and would be less affected by settlements or explosions.

8.5 REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT

If possible, alternatives that reduce the toxicity, mobility or vo
treatment
are preferred. Alternatives A and B provide no reduction in contaminant
or volume.
Alternatives C, D and E will reduce mobility by exercising control over
surface runoff.
Alternatives D and E also will reduce mobility by stopping or reducing t
contamination into
groundwater, but these actions would not reduce the toxicity or volume o
Alternative C
potentially results in reduced toxicity or volume, by promoting interact
added chemicals with
the waste materials. However, at this time, the extent to which this wi
known.

8.6 SHORT TERM EFFECTIVENESS

Alternatives A and B do not create any additional risks during implem neither alternative would require direct operations within Old O-Field. Alterna require no implementation time because no actions are taken. Alternative B could be i very short time because most of the provisions are already in place at the site.

For Alternatives C, D and E, protection would be achieved as soon as completed. Alternative C would require 12 to 18 months to design, and approximately 24 prepare the site and construct the sand cover. Alternative D would require about 12 to 18 m and 48 months to construct the foam cap. Alternative E would require 12 to 18 mon and approximately 24 months to prepare the site and construct the multi-media c

During construction, each alternative would create disturbances and a on the field, which would increase the risk of initiating a fire or explosion. Th short-term risks for site workers and surrounding communities. There is an added risk other contaminants could be released from Old O-Field during implementation of an options. Under Alternative D, workers could be subjected to fluorocarbon exposures during application, and the environment would be subjected to the deleterious effects of fluorocarbons.

In terms of loading on the field, Alternative D would create less sho Alternatives C or E because lighter-weight materials would be used. Alternatives C and potentially significant short-term risks because they require moving and placement of e above the present surface of Old O-Field. Alternative E would create higher short-te Alternative C because of the larger quantity of material placed and the need for compacti mechanical earthmoving equipment. It may be possible to place materials under Alte using equipment directly on the field, although this is not possible for Alternat

The development of safe and effective ways to construct the remedial important part of the concept design phase. Site safety, health, and emerg would be developed which minimize all potential exposures to site workers. Al for preventing releases and exposures would be incorporated into the remedial design, t nature of the site does not allow certainties in estimating effects of constructing an

at Old O-Field.
These short-term risks must be weighed against the longer-term risk redu
each alternative.

8.7 IMPLEMENTABILITY

Alternative A would be the most easily implemented alternative bec
actions at
the site and does not require maintenance of existing institutional cont
would require
no more than continuation and upgrade of the access controls and air mon
that are in
place at Old O-Field. Construction of Alternatives C, D or E at Old O-F
complicated by the
unique and unknown hazards posed by the site. The stability and foundat
the site are
uncertain. Site preparation and construction activities would be necess
of unexploded
ordnance, CWM, and white phosphorus, which may cause dangerous construct
conditions.

Between Alternatives C, D and E, Alternative C would be the easiest t
would
require the least amount of specialized materials and equipment. All mater
construction
are readily available. Materials placement would require less sophistic
Alternatives
D and E. Required maintenance would be relatively simple, consisting of
depressions that form
in the sand layer and maintaining the air monitoring and sprinkler syste

Alternative E would also be implementable. All materials and equipme
multi-
media cap (foundation materials, synthetic layers, top soil, low ground
earthmoving equipment,
etc.) could be readily obtained near APG. Maintenance of the multi-medi
the most
complicated of the three cover alternatives due to the relative complexi
system.

Alternative D would be the most difficult of the alternatives to i
of this size
and specilaized use has not been previously attempted. The remote and r
construction
methods that have been assumed will enhance safety, but are not readily
methods
would require development and testing prior to implementation. The foam
require a longer
time to construct than Alternatives C or E because of the remote-control
equipment

used.

8.8 COST

Table 8-1 provides a comparison of the costs of the five alternati
consideration.
Total capital, annual O&M costs, and present worth (discount rate of 5%)
alternative are
presented. The progression of total present worth from least expensive
alternative is:
Alternative A (no cost), Alternative B, Alternative C, Alternative E, an
Alternative C is the
least costly of the three containment alternatives because it requires t
equipment.
Alternative E is similar to Alternative C in methods of construction and in
materials, but more
materials are required for Alternative E. Alternative D is the most cos
large quantities
of specialized materials and equipemnt that have been assumed for remote
the foam cap
and the longer construction time.

8.9 STATE ACCEPTANCE

The Maryland Department of the Environment (MDE), Waste Management
Administration, concurs
with the selection of Alternative C, Permeable Infiltration Unit (PIU) a
for the Old O-Field
source area (Operable Unit 2) at Edgewood. The acceptance of this optio
PIU system's
resistance to potential explosive events and its ability to detect and m
CWM.
Additionally, the PIU will provide the opportunity to conduct and evalua
alternatives,
monitor long-term stability of the waste, and evaluate the rate of subsi
dynamics of
the fill area.

In conjunction with the groundwater treatment system currently bei
(Operable Unit
1), the PIU will provide isolation of the waste, effectively controlling
ingestion of
contaminated material and the discharge of contaminated groundwater to W
Furthermore,
the Department considers the permeable material, principally sand, to pr
"first" layer
of cover for the foundation of an impermeable cap, should such an option
more practical
at a future date.

TABLE 8-1
Comparison of Costs for Old O-Field Remedial Alternatives

Costs in 1994 Dollars

Alternative	Description	Capital Cost	Annual O&M Cost	Present Worth (30 years, 5%
B	Limited Action	$690,000	$180,000	$2,1
C	Permeable Cover	$11,041,000	$269,000	$15,175
D	Foam Cap	$18,421,000	$275,000	$22,647
E	Multi-Media Cap	$11,215,000	$460,000	$18,285

8.10 COMMUNITY ACCEPTANCE

Comments and responses from the July 14, 1994, Public Meeting were tr are included in the Responsiveness Summary (Appendix A). In addition, all w received from the community are addressed in the Responsiveness Summary.

8.11 SUMMARY OF DETAILED EVALUATION

Based on the comparison of alternatives that has been conducted in following general conclusions may be drawn:

Alternatives A and B would not meet the threshold evaluat Alternative A would provide no protection of human health and the environment Alternative B (continue existing institutional controls, continuous air monitoring, and periodic review of site conditions) would long-term protection of human health and the environment.

Alternatives C, D and E would achieve the remedial action stabilizing the surface, cutting off oxygen to the field, and reducing th explosions at the site. Alternatives D and E would not actively treat the but would rely on isolation of waste materials within the site to r

Alternative C would provide the best long-term protection

the
environment and the best protection against potential age
In
addition, Alternative C includes the potential for treatm
remedy.

9.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA the detai
alternatives, and public comments, the U.S. Army, with the concurrence of t
MDE, has
chosed Alternative C, the construction of a Permeable Infiltration Unit,
appropriate remedy
for OU2 at the Old O-Field source area of Aberdeen Proving Ground, Aberd

The Permeable Infiltration Unit will be composed of sand or other
This sand
layer will cover the entire surface of Old O-Field and be of sufficient
the likelihood
and potential effects of an explosive or evaporative release of CWM from
thickness of the
PIU would be determined during the remedial design phase to balance the
and vapor
attenuating properties of the cover versus the risk posed by excess weig
An air
monitoring system will be built into the PIU to allow monitoring for CWM
space of the PIU.
A sprinkler system will be constructed that will be capable of quickly w
the PIU. In
case significant levels of CWM are detected within the PIU, the sprinkle
In addition, the
sprinkler system will be used to conduct a setied of treatability studie
feasibility of
enhanced leaching of the contaminants to groundwater, where they will be
OU1
groundwater extraction system and treated. The subsidence of the field
to evaluate the
stability of Old O-Field and its ability to bear a load.

The OU1 groundwater extraction and treatment system will be reeval
that
contaminated groundwater emanating from Old O-Field will continue to be
treated.

Institutional controls will be implemented to limit access to the
of the
sand layer, and provide long-term maintenance of the PIU. Land use rest
implemented to
limit the future land use of the site and require permits, qualified sup
and safety

precautions for any activities conducted at the site.

9.1 REMEDIATION GOALS

The purpose of this interim response action is to control the risk
exposure to
CWM and other chemicals within the Old O-Field surface and subsurface so
response action will
control these risks by covering the site with non-flammable materials, m
flow to the surface
of Old O-Field, stopping erosion and stabilizing the soil, providing a b
top of the
ordnance, and providing a vapor barrier to reduce the concentration of C
underground
release. Existing conditions at the site have been determined to pose a
health and the
environment at an unacceptable level. Although the possibility of a CWM
the potential
effects of a release are large enough to justify the need for an interim
time.

To evaluate the feasibility of enhanced in-situ leaching, treatabi
performed using
the sprinkler system and the OU1 groundwater monitoring system. In addi
subsidence of the PIU
will be monitored to evaluate the ability of Old O-Field to bear a load.
used to evaluate
the final remedy for the site.

9.2 COST OF SELECTED REMEDY

The total capital costs for installation of the PIU is estimated at $
annual
costs are estimated at $269,000, and the total present worth of these co
5% discount

rate over a lifetime of 30 years, is $15,175,000. These costs are outli
time and cost
estimates for this alternative are highly dependent on several factors,

construction methods;
health and safety considerations;
assumptions made for stability/settlments of Old O-Field sur
amount of time required for surface investigations/clearance
assumptions made for topography; and
delays due to clearance or other range operations.

TABLE 9-1
Summary of Costs for the Selected Remedy
Alternative C: Permeable Iniltration Unit

ITEM	COST
Capital Costs	
Administrative Actions	$50,
Site Preparation and General Actions	$1,097,
Surface UXO Clearance	$700,
Permeable Infiltration Unit Construction	$3,847,
Long-Term Monitoring	$485,
Contingencies (60% of Capital Subtotal)	$3,708,
Engineering & Design (25% of Capital Subtotal plus Contingencies)	$962,00
Permitting & Coordination	$192,00
Annual Operation and Maintenance Costs	
Program Oversight	$78,00
Long-Term Monitoring & Five-Year Reviews	$137,00
Contingencies (25% of Annual Subtotal)	$54,000
Present Worth of Annual O&M (30 years, 5% discount rate)	$4,134,
Total Present Worth (Capital and Annual Costs, 30 years at 5% discount rate)	$15,175,

10.0 STATUTORY DETERMINATIONS

The Army's primary responsibility at its NPL sites is to underta that achieve adequate protection of human health and the environment. When complete, remedial action for this site must comply with applicable or relevant and appropriate env established under Federal and State environmental laws unless a statutory waiver is j selected remedy also must be cost-effective and utilize permanent solutions and alternati technologies or resource recovery technologies to the maximum extent practicable. Finall preference for remedies that employ treatment permanently and significantly reduce the v or mobility of hazardous waste as their principal element should be satisfied, if fea sections discuss how the selected remedy meeets these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected interim remedy protects human health and the enviro the probability and severity of releases due to fire or explosions, while maint subsurface and enhancing degradation and leaching of the wastes. Short-term risks during could be controlled by properly selecting application methods during the concept des Alternative C will therefore not present unacceptable short-term risks when weighed against th additional action is not taken. The permeable layer would stabilize the existing surf offer increased proteciton against fires and explosions. The layer would allow i precipitation and additional water provided by a sprinkler system. Saturation of the permeab reduce CWM vapor emissions. Treatment processes could be tested by adding chemical re applied water.

Continued or accelerated leaching of contaminants would occur, and the leac collected by the groundwater extraction and treatments system.

10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy, construction of a PIU, will comply with all a and appropriate chemical-, action-, and location-specific requirements (ARARs). will achieve the chemical-specific ARARs through the use of surface water runoff controls an construction methods that minimize the generation of dust. There are no location-specif action-specific ARARs for this interim remedial action. The ARARs are presented below.

10.2.1 Chemical-Specific ARARs

The State of Maryland has promulgated surface water quality stan classifications for surface waters (COMAR 26.08.02) (applicable).

The State of Maryland regulation which sets the primary standard matter (COMAR 26.11.03) (applicable).

The State of Maryland regulation establishing ambient air qualit public health and welfare (COMAR 26.11.15) (applicable).

10.2.2 Location-Specific ARARs

None.

10.2.3 Action-Specific ARARs

None.

10.2.4 Other Criteria, Advisories, or Guidance To Be Considered for the (TBCs)

Institutional controls will be implemented to limit access to th disturbance of the sand layer, and provide long-term maintenance of the PIU. Land use rest implemented to limit the future land use of the site and require permits, qualified sup and safety precautions for any activities conducted at the site.

10.3 COST EFFECTIVENESS

The selected remedy is cost-effective because it has been determ overall effectiveness proportional to its costs, the net present worth being $15 estimated costs of the selected remedy are less than the cost of the foam cap and multi-med

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES (OR RESOURCE RECOVERY TECHNOLOGIES) TO THE MAXIMUM EXTENT PRACTICABLE (MEP)

The Army, EPA, and the State of Maryland have determined that th represents the maximum extent to which permanent solutions and treatment technologi utilized in a cost-effective manner for the source control interim action at Old O-Field. that are protective of human health and the environment and comply with ARARs, th and the State of Maryland have determined that this selected remedy provides the best tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobili achieved through treatment, short-term effectiveness, implementability, cost, also consid preference for treatment as a principal element and considering community acceptance. allow continued migration of contaminants to the groundwater treatment system, and offer overall remedial action by allowing the performance of treatability studies and subsidenc will lead to a final remedy for the site.

Excavation and treatment options were considered in the Feasibil project, and these alternatives were judged as being too dangerous to implement at th unknown conditions and the risk of release of CWM during invasive activities. T alternatives considered in the detailed evaluation consisted of containment options, in addition Limited Action.

Without the construction of this remedy, Old O-Field poses the p explosion and air release of CWM or the rupture of a buried container and evaporat CWM. The possibility of this occurring is small, but not insignificant, while the event, should it occur, could be severe. The construction of a PIU will minimize the pot release to occur and will also reduce the effects of such a release.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The statutory preference for remedies that employ treatment as a satisfied by this remedial action. Treatability studies of in-situ enhanced leaching evaluate the ability of water and other solutions to flush the contaminants from soil of a permeable

infiltration unit will allow rainwater and appiled solutions to percolat materials and continue the natural degradation of the buried materials. Further treatment may be final remedy.

11.0 SELECTED REMEDY

The proposed plan for Operable Unit Two, Old O-Field, Aberdeen P Aberdeen, MD, was released for public comment on June 22, 1994. The Proposed Plan Alternative C, the Permeable Infiltration Unit, as the preferred alternative. The U.S. the State of Maryland Department of the Environment reviewed and considered all comme during the public meeting and during the public comment period. Upon review of the was determined that no significant changes to the remedy, as it was original Proposed Plan, were necessary.

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APPENDIX A
RESPONSIVENESS SUMMARY

I. TRANSCRIPT OF THE PUBLIC MEETING

II. RESPONSES TO COMMENTS RECEIVED AT THE PUBLIC MEETING

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

A. COMMENTS RECEIVED FROM THE ABERDEEN PROVING GROUND SUPERFUND CITIZEN'S COALITION

B. COMMENTS RECEIVED FROM MR. GAIBROIS

IV. RESPONSES TO SURYEY FORM SENT TO ALL CITIZENS ON THE APG MAILING LIST

V. RESPONSES TO SURVEY FORM SENT TO ALL TECHNICAL REVIEW COMMITTEE MEMBERS

RESPONSIVENESS SUMMARY

I. TRANSCRIPT OF THE PUBLIC MEET

The transcript of the Public Meeting (July 14, 1994) for the Pro During the question and answer session, Army, EPA, and State of Maryland representa to questions from the audience.

ABERDEEN PROVING GROUND

PUBLIC MEETING

FOR

OLD O-FIELD SOURCE AREA

MAGNOLIA ELEMENTARY SCHOOL

901 TRIMBLE ROAD

JOPPA, MARYLAND

July 14, 1994

6:30 p.m.

Reported by:

Heather R. McLauchlin

TOWSON REPORTING COMPANY, INC.

*   *   *   *   *

P R O C E E D I N G S

BARBARA FILBERT: Welcome to our public meeting tonight. We appreciate your taking the time to learn more about our environmental program. The purpose of this particular meeting is to discuss one of the proposed cleanup actions at the Old O-Field area, which is on the Gunpowder Neck peninsula in Aberdeen Proving Ground's Edgewood area.

I'm Barbara Filbert from the Aberdeen Proving Ground Public Affairs Office. First, I'd like to introduce several people here tonight who can answer questions you might have about this project or others: Mr. Joe Craten, who's Director of APG's Directorate of Safety, Health and Environment; Ken Stachiw, who's Chief of the Environmental Restoration and Conservation Division; John Paul, who's project officer for risk assessments; Cindy Powels, who's the project engineer for O-Field.

Also with us this evening is Steve Hirsh and Kathy Davies from the US Environmental Protection Agency

and John Fairbank from the Maryland Department of the Environment. I would also like to point out that Chris Grochowski of the APG Superfund Citizens Coalition is here this evening. The citizens coalition is an active citizens group involved in our environmental cleanup program.

Since this is a required meeting, we have a court reporter present to record all of our proceedings. The transcript from tonight's meeting will be available for your review at the Aberdeen and Edgewood branches of the Harford County Library, Washington College in Chestertown, and Essex Community College in Essex.

After Cindy Powels completes her presentation, we will open the meeting for questions and comment. We have index cards at the entrance of the room. If you didn't already receive one, we'd be glad to give you one. And you can write questions on the card, and we'll collect them at the end of the presentation. However, of course, we will still try to address your verbal questions or comments.

I hope everyone picked up one of the fact sheets

that was at the demonstration table back here. It more or less gives an overview of the proposed cleanup actions that we're going to present tonight.

If you have questions on other areas of our environmental program, please see myself or any of the individuals from Aberdeen Proving Ground that I introduced. We will be glad to answer your questions.

And if we don't have the answer, we'll certainly get back to you. We also have an information line available twenty-four hours a day. If your're not aware of the number, the local number is 272-8842. For Kent and Baltimore County residents, we have an 800 number. It is 800-APG-9998.

Now I will turn the meeting over to Ken Stachiw, who will give you an overview of APG's installation and restoration program.

KEN STACHIW: Good evening again and welcome to our presentation about Old O-Field. What I'd like to do is perhaps give a setting of what we're talking about to bring the big picture into a narrow focus. Aberdeen Proving Ground has a fairly comprehensive environmental

program which we more or less define with four pillars. It is defined by prevention, conservation, compliance and restoration.

Prevention is our attempt to try -- our attempt before a project begins such as to do a test or to do an operation or to build a building or something of this nature. We're increasing the mission capacity of APG. We study it and determine its environmental impact before we actually complete the task.

Conservation is out attempt to manage wildlife and other types of our ecosystem at APG. Frequently the environmentalists get so hung up on hazardous materials that we can't see the forest for the trees so to speak. And we feel that it's very important that we manage life as opposed to just having a sterile environment, you know, chemical free.

We're trying to create something that enhances life and allows life to propagate, you know, both in the Chesapeake Bay and on the terrestrial areas of APG. That's the ultimate goal of the environmental program. It should be the ultimate goal of the environmentalists in

general.

Compliance is part of the program that is dedicated toward having all of the emissions and concerns of this nature in compliance with regulations. Things like air pollution control, permits from incinerators, permits from existing landfills, the management and regulation of existing facilities. That's pretty much what compliance is dealing with.

Within the realm of this, things such as the Chem Demil facility falls under this realm. Tonight's topic will not discuss things like the Chem Demil or the stockpile disposal. We're not here to address that particular issue tonight, but if there is sufficient interest, we can always get those people together to have a meeting and discuss that further.

Things such as the UNDEX pond or some other concers have been raised in the past, or radiation, they are all various topics which are not really what this evening was scheduled for. We don't have the experts assembled for that. We're here to focus on restoration tonight. I'll speak a little bit about that program and

then narrow the focus down from that to Old O-Field.

Now, restoration is a program that's designed to take past contamination and restore it back to -- as best we can -- conditions in accordance with various laws and so forth.

Just to give you a history of APG, the Aberdeen area here was first established in 1917-1918 time frame and was dedicated to the use of -- for testing military equipment, testing weapons and the like, as you're probably familiar with, those who live in this area. The Edgewood area was devoted primarily to research and development, testing and production of chemical warfare and related materials, chemical warfare agents. Both, as you can imagine, are highly industrial activities. Both required the use of lots of hazardous materials. And, obviously, both resulted in the use and disposal of various types of hazardous waste, both in the Aberdeen area and the Edgewood area, different types perhaps, but still hazardous.

Back in 1917 through roughly 1970, okay, the environmental laws were not that many. There wasn't that

much in the way of regulation for the disposal of hazardous materials at that time. So people did what they thought best at that time in terms of burial or other means of disposal. As time went on and environmental science grew, we began to realize that some of the past activities were not good enough.

They did what was best, and I don't judge their intentions of their hearts. But as it turns out, some of the way they managed their waste products at that time ended up in contamination.

In roughly the mid-80's, the EPA charged us to look back in our history and determine what kinds of contamination may have resulted from all our past operations. And we did that, and we did a two-and-a-half year study in both areas.

With the studies -- any you can find these studies in the libraries we talked about at Edgewood and Aberdeen, you can read these studies. And there are the two major studies. They determine in total three hundred eighteen -- roughly -- solid waste management units.

By a "solid waste management unit," I mean a unit

with solid -- a location where solid waste was managed, not necessarily disposed, but managed. Okay. A place where they may have stored a rack of drums of solid waste, a place where they may have disposed of something, incinerated something. Primarily the idea being that while solid waste was managed there, the potential exists for there being a release of hazardous materials in that location.

So some of these sites may be no bigger than this table, and some of the sites are as big as this room, and some of the sites are as big as a 30-acre landfill. So there is a whole variety. They are not the same size. Some you couldn't get them on a map because they are so small.

But we do have these, and all of them by regulation, by law, have to be addressed. We don't know whether anything has been released into the environment because of these things or not. But we have to at least investigate, go back, look into them and make a determination as to whether or not something took place that needs to be fixed.

For the sake of management, okay, these were sort of clustered into thirteen study areas. Here's a map of -- you can't tell completely by this map, but it's color coded, the whole map is divided up into thirteen particular units. At each of them we're going to have to do a fairly detailed investigation, and we're regulated by the EPA to come up with a set of documents that defines the problems, okay, presents solutions, works with the public to come up with a final decision, and then an implementation of that decision, and then monitoring. Let me show you a diagram of this.

This is the process by law that we have to go through for these thirteen study areas. The first step is preliminary assessment and site investigation. This is primarily handled by the documents that I talked about that are in the library that identify them.

The next step is what is termed "remedial investigation." And that's where we do in-depth environmental sampling. We sample the ground water. We look at the site, and we determine was there a release to the environment. If there was a release, how far did it

go and where is it going to go in the future.

We also do what's termed a "feasibility study." And in this feasibility study, we're determining, okay, now that we know what the contamination is, what is a proper solution to this problem. Will it solve itself. Do we need to dig it up. Do we need to put a barrier around it to contain it. What's the proper solution to this. That's called a "feasibility study."

The feasibility study and remedial investigation also include a thing called a "risk assessment," which helps us determine exactly what we need to do to clean up. It determines the risk involved so we can determine if cleanup is necessary or not.

The end result, of these documents is called the "proposed plan." The feasibility study makes a recommendation and says, We think this is what should happen at this site. The proposed plan tells the world, This is what we propose to do. Does anyone want to change this? Do you have any objections to this? If you do, please speak now and put input into this particular decision-making process.

Once a meeting is held like tonight, information is gathered together, the material comes back to ourselves and the EPA and APG and a decision is made based upon all these things together as to what is the wisest solution to that particular problem and that leads to what is termed a "record of decision." The decision is published in the newspapers saying, Based upon all the studies and input, we think this is the best thing to do in this situation.

At that point, a design is made on whatever the decision is. It's called a "remedial design." That has public review time as well. Once the design is completed and the design is put into place, built, constructed, the remedial action begins.

This could take place in all of six months and be completed. It may take fifteen years for the action to be totally completed. During that time, monitoring is done, as well as a five-year assessment, to see, you know, we thought this was the right move, was it correct indeed. We go back and reevaluate it and make sure the contamination that we proposed to manage in this way is

being effectively managed.

If not, then we have to go back and begin the process all over again so to speak, at least to make a determination as to what we need to do to amplify or enhance the system.

If it's working, we bring it to completion. If the site seems to be totally cleaned up, we make a proposal that the thing be considered done.

Now, we're supposed to do this for all of the thirteen study areas. Unfortunately, they are so big and complex, all right, that sometimes it would take years and years and years before we come to a final decision on the entire piece of property that we're trying to deal with. So the laws allow us to do what are termed "interim actions." Actions which make sense to do now. It's not necessarily the final solution, the most comprehensive solution, but it's something that makes sense to do now while you're coming to grips with the final solution. And that's what we're going to be talking about tonight when we talk about an interim action. It's something that makes sense to do now for environmental

protection so that further degradation of the environment and safety is promoted while we're continuing to make a full determination as to what the final solution should be.

The law allows us to do what are termed "interim ROD's" and "early action RODs." And that's part of this process. Right now we're in the process of coming to a recommendation decision about a location called O-Field. Cindy is going to describe this to you in depth, but for now, we're just focused on this. And I want to make a point that this is not the only problem here at APG. There are lots of study areas. There are lots of decisions to be made, but this is only one. And we're focusing on this effort tonight. It doesn't mean we're not going to look at what's going on up here, it means we're focusing on this red dot that's Old O-Field tonight.

We're going to try to focus our discussion on that tonight itself. If for some reason you have questions about some of the other sites, we're more than happy to address those perhaps on the side after the meeting or perhaps in our offices later on. We're more

than happy to address those. As Barbara said, we have an information line. All you have to do is pick up the phone and ask the question, and we'll get back to you with an answer. So, once again, we'll focus on Old O-Field.

Cindy, are you ready to go now? Okay.

BARBARA FILBERT: As Ken said, Cindy will be giving us an overview of the cleanup actions that are proposed for this particular site. She's been an environmental engineer for over thirteen years, and she joined Aberdeen Proving Ground in 1985. She is responsible for overseeing all action at O-Field as well as the Westwood area of APG. Now she will give a presentation.

CINDY POWELS: If we leave these lights on, can everyone see okay to read these? If not, just please let me know. If you can't hear me, please let me know.

For my presentation, what I'd like to do is briefly go through a little bit about the location and history of the site and then get into what we've done as far as our feasibility study to look at the hazard assessment, the goals that we want our proposed actions to

accomplish, and then look at the alternatives that we evaluated. And then I'll briefly go through a schedule of some of our future activities that we're planning for this site.

As Ken mentioned, the site that we're going to be talking about is called Old O-Field. The O-Field area is, again, located in the Edgewood area about two-thirds of the way down the Gunpowder Neck. We right now are located here at the Magnolia Elementary School. It's about five miles from O-Field to where we are now, just to give you an idea of some distances there.

This shows the O-Field study area, and the O-Field area has two major disposal sites. The Old O-Field area, which is what we're going to talk about today, and then the New O-Field area. Historically these areas were used -- this Old O-Field area was used from the late 1930s until 1953. It's a four-and-a-half acre landfill. It was used for disposal of chemical munitions, chemical warfare agents, wastes from the research and development operations that were conducted in Edgewood. Contaminated equipment was disposed of at the site, and

other miscellaneous hazardous wastes. There was also some burning and some detonations that were done in the Old O-Field area.

After this area closed in the early '50s, the New O-field area was established to get rid of some of the wastes that were being taken out of here, they were being taken here and were being disposed and detonated and open burned. There was also some limited disposal at the new area. There was also some limited disposal at the new contaminated, and it's migrating towards Watson Creek and will then be discharged into the Gunpowder River.

In 1991 we went through this exact process that we're going through now, and we made the decision to treat the contaminated ground water as it's migrating from Old O-Field toward Watson Creek. And the way we're doing that is by installing extraction wells along here in between the landfill site and where the water discharges into Watson Creek. So we're basically stopping that water, taking it out of the ground. We then run it through the ground water treatment plant to remove all the contamination, and that clean water will then be

discharged into the Gunpowder River.

Right now we're also continuing environmental studies of the whole area, principally focusing on New O-Field and Watson Creek, and those studies will continue.

Today, again, I want to focus on this landfill site here and the feasibility study that we've recently just accomplished.

As I mentioned, the Old O-Field area here, there have been several attempts in the past to clean up this area; however, they have been very limited to mostly disposal and cleaning up of surface debris. There hasn't been a lot of excavation. So a lot of those munitions are still in place out there.

We know there have been several unplanned detonations and fires out there, one of them as late as 1984 where there was a fire. One of the munitions caught fire and set the field on fire.

Because we feel that there is a continuing risk from detonations and from fires on the site, we feel that we need to do something to control those risks, and that's why we conducted this feasibility study to further reduce the risks from these areas.

The first step in the process was to conduct a hazard analysis, and what we did is we used the worst case scenarios and calculated the risk. So any actual risk would be much less than the risk that we calculated. The bottom line is that there is a risk from a fire, from a detonation causing effects to nearby workers and on-post residents. It would take a very large event to occur to actually effect off-post citizens; however, any risks, we feel, are unacceptable. And that's why we want to take these actions to try to protect the public as much as possible.

The chances of a catastrophic event happening are very low. You would have to have the right conditions. You would have to have exact weather conditions to have off-post releases, but, still, we feel we need to do something to prevent those from occurring.

Currently we're addressing the hazard at the site by restricting access to the area. No one has access to the area without going through a lot of health and safety plans being prepared. Security at the area has been

upgraded quite a bit recently, and we've got a lot of security measures out there now.

Also, we're installing some air monitoring systems out there around the perimeters of the field. We've got five units that are being installed, one is also already on line. And they will run continuously taking samples every eleven to fifteen minutes. They will be monitoring for nerve agents as well as mustard. Once that's running smoothly, we plan to upgrade that system for other types of chemicals as well. And emergency response procedures are, of course, in place in case there was an incident.

In order to further reduce the risks, our feasibility study established some goals that we want each alternative to meet, and those goals are shown here. Basically we want to make sure we reduce the risks from allowing a fire or a detonation to occur. We want to prevent these things as much as possible. We also want to reduce the risk from evaporation. If something starts to surface out there, we want to prevent evaporation from that leak occurring. Further, we also want to reduce or

eliminate any effects if there was a fire or if there was a detonation. So we have not only prevention of a fire or detonation but also a way to try to contain it or control it.

Our next step in our feasibility study was to perform an initial screening of alternatives. We looked at quite a few, and two key factors that we used to evaluate them were whether or not they would protect the public, the workers here, and the environment, not only over time but also during implementation. This is where we construct or implement one of the alternatives and see is it going to protect human health to the workers and to off-site residents and then make sure that the technology was reliable in meeting the goals that we just discussed. We looked through quite a few alternatives, and some of the ones that we screened out I'm going to go through just briefly. Basically they were eliminated either because they had unacceptably high short-term risks for implementation or because they had questionable or uncertain effectiveness in whether or not they'd be able to meet the goals that I discussed.

Excavation is one option I think all of us would like to see. We'd like to see that thing dug up and go away. But, unfortunately, we feel the risks of doing that are just much too great. And we can't subject either the workers or the off-site residents to the risks involved in trying to excavate this area. You've got munitions which could be explosive. You've got chemical warfare agents.

If you has a fire and a release during the excavation, we would be concerned with off-post migration of the chemical agent.

There is a lot of a substance called white phosphorous out there. White phosphorous was used by the military to create smoke. When it's exposed to air, white phosphorous will start burning. It was also used by the military for its effectiveness at causing fires. We don't want white phosphorous starting to become exposed and being in contact with air and catching fire.

There are also other items out there that could be shock sensitive and cause explosions. To excavate, unfortunately, right now would be much too much risk that we wouldn't be able to implement.

Some of the other alternatives that we looked at included various types of explosion resistant caps as well as vertical barriers. The ones that we screened out had unacceptable short-term risk or we are uncertain about their effectiveness.

Other options included cutoff floors, entombment, containment structures. Again, these had questionable effectiveness and/or unacceptable short-term risks.

In-situ treatment was another alternative that we looked at that was screened out. That would be trying to treat the waste in place. And that was screened out because of unacceptable short-term risks and effective technology currently being unavailable.

Off-site treatment was also considered; however, that would have required excavation.

And, finally, ex-situ treatment was considered. That's treatment on-site, but that would, again, require this being dug up. That would require excavation and involve high short-term risks.

The alternatives that we came down to for our detailed evaluation are shown here, and we've got five

alternative here. And I'm going to go through each one in further detail just a little.

The no-action alternative is required by law to be evaluated primarily as a base line for the other alternatives. The limited-action alternative is basically what we already have. It would require long-term monitoring, access restrictions similar to what we have, and land-use restrictions as far as future use.

The next alternative that I want to talk about is what we call a "permeable infiltration unit." It would basically consist of covering the surface with sand which would provide a barrier to animal intrusion, a barrier to oxygen getting to white phosphorous and possibly causing fires. It would help give protection if there was a fire.

Plus, the key feature here that is different than the other two options I'm going to talk about next, is it would allow water to infiltrate or permeate through the sand and through the waste material underneath. And the water then that would go through the sand would then be captured by our ground water treatment plant which is now being installed. And the positive feature here that's a

little different than the other two alternatives I'm going to go through is that this would allow us to perform further studies to evaluate, can we do enhanced leaching or enhanced degradation by applying water or solutions on top of the sand to percolate through the waste to encourage the natural degradation that's currently taking place.

Based on what we see now in the ground water, we can see that a lot of these agents are naturally degrading and then going into the ground water, and we're going to pick that up through our treatment system.

This would be considered an interim action because it would require us to further study treating the waste in place through enhanced leaching and enhanced degradation.

This is a cross-section to give you an idea of what this might look like -- and this is just an initial idea. You would have several feet of sand on top of the landfill. The sand would be allowed to fill in the voids where there are trenches, holes, erosion. The sand would tend to fill in these areas and stabilize the surface of

the field. We would have the air-monitoring system in here where we would be able to pick up any vapors if there were any in the area. So we would be able to pick them up early and detect them right away.

Then we have more sand. Then we have a geotextile fabric followed by gravel or crushed stone to prevent wind or soil erosion on top of the sand. And then we would have a sprinkler system which we would use so if there is an air release or fire we could quickly quench it by getting a barrier to the site. Plus we could use this to further study ways to treat the waste in place and to encourage the waste to degrade. But that would have to be studied in further detail after we've got the cover installed.

The next option that I want to talk about would be considered a final action, and this would be covering the field with an impermeable foam cap that would not allow water to get through the waste. Basically we would spray a thin layer of polymerizing urethane foam over the surface of the field. This would give us very similar protection as far as preventing a fire or preventing an

explosion, but it would not contain a fire or explosion as the sand cover would. We would then have a polysulfide coating applied to the top so that it would not break down.

This would provide the same good protection that the permeable infiltration unit would. The foam would basically cover the field followed by the lining to prevent sun from degrading the foam.

One of the benefits or positive features of the foam is that it's very light weight. It won't create a high load on the field as far as weight. Plus, this is something that could be sprayed on. We won't have to have heavy equipment running over the top of the field, and we would remotely apply that using robotics. However, we would have to remove the vegetation from the site similar to what we would do with the permeable infiltration unit. The short-term risk here would be less because you would not have so much direct work on the field surface itself.

The last alternative that we looked at is a hazardous waste landfill cap which would be constructed to be impermeable, again, to prevent water from infiltrating into the site. This one, again, as the other ones, would help prevent fires and help prevent explosions. This would give us better blast protection than the foam cap but not quite as good as the sand does because the complex layering system would be a little easier to breach than the thick layers of sand.

To give you an idea of what a cross-section might look like through the hazardous waste landfill cap, you would have several feet of crushed sand and gravel at the bottom, followed by geograde for stabilization, and then some more sand. And this would basically be your impermeable layer. You would also have gas venting strips and a drainage system to collect any water that would get through this upper layer which would be soil. And that would be followed by vegetation along the top.

The five alternatives were then evaluated against nine criteria which are already established in the EPA's regulations on conducting feasibility studies. The first one is the most important, which is the overall protection to human health and the environment. The second one we

looked at is whether or not the alternative complies with environmental laws and regulations, both state and federal. We also thirdly looked at long-term effectiveness and whether or not it would be a permanent solution to our problem.

Another important criteria was whether or not the alternative would reduce the toxicity and mobility and volume of waste through treatment. Short-term effectiveness was probably one of out most critical criteria we looked at because we don't want to make the risks any greater than they already are. And then, finally, we looked at whether or not we could implement the alternative, whether or not it was feasible.

We also looked at cost. We looked at whether or not the state accepted the alternative. And, finally, we're at this stage which is community acceptance. And that will be evaluated at the end of the public comment period.

We've got a quick summary here which shows the alternatives -- which helps to show the alternative and how we evaluated it against some of the criteria. Of

course the not action and limited action are not acceptable because they don't meet the first criteria which is the protection of human health. So they didn't need to be evaluated any further.

The permeable infiltration unit and hazardous waste landfill cap would both meet the criteria because it would give you that blast protection. The impermeable foam cap partially met the requirement because it would not give you as much blast protection. It would still give you good protection as far as preventing a fire or an explosion, but it would not give you the blast protection.

And one of the things that I should have mentioned earlier -- I forgot -- is that any of these options would not only address the imminent explosion hazards, but it would also address the hazards associated with the low levels of contamination that would be in soil, that would be induced in the animals that might be exposed here. I'm not discussing that in great detail because the real high risks would be if there was a fire or an explosion.

As far as federal and state laws, all the

alternatives meet those requirements. With regard to short-term risks and short-term effectiveness, all of them have drawbacks. The foam cap would have the least amount of short-term risk because it would be sprayed on by remote techniques without heavy equipment directly on the field.

Next, the permeable infiltration unit which would have some short-term risks but not quite as much as the hazardous waste landfill cap which would have more short-term risk than the other two primarily because it's a more complex layering system, and it would be a little more difficult to install.

The permeable infiltration unit, because we would be applying sand, there would be a lot of techniques that would be evaluated in the concept design that we would be able to evaluate the risks on how best to apply that sand so we could control the short-term risks. For example, we might want to use water to slurry the sand on the field so we wouldn't have to have heavy equipment out on the field. We could use low ground pressure vehicles which would have less direct pressure on the field by distributing the

weight more evenly. In addition, we would also consider putting the sand on in layers where you push the sand out before you actually drive out onto the field to apply it.

With regard to long-term effectiveness, the permeable infiltration unit would give you the best blast protection but similar protection as far as prevention. The foam cap would give you the least amount because it would not give you blast protection. And the hazardous waste landfill cap would be somewhere in the middle as far as blast protection, not quite as much as the permeable infiltration unit, but better than the foam cap.

With regard to reducing toxicity and volume of the waste, we felt that the foam cap and the hazardous waste landfill cap only partially meet these requirements because they would reduce the mobility of the waste, but it would not help reduce the toxicity or the volume as would the permeable infiltration unit.

As far as implementation, the permeable infiltration unit would be the simplest and easiest to install. Next would be the hazardous waste landfill cap which is a little more complex because of the layering

system. And the foam cap would be very implementable but would only partially meet the criteria because you would have an extra six months involved in developing the technology.

Cost effectiveness, this just shows the capital costs. There would also be operation and maintenance costs, and those would be in the fact sheets for the feasibility study.

Based on our evaluation, we feel that the permeable infiltration unit is our preferred alternative because it gives us the best balance of features with regard to the overall protection of human health and the environment. It would reduce the risk of fires as we've discussed, and it would reduce the risk of detonation as we've discussed. And it would reduce the risks associated with a fire or detonation if one would occur. Plus it would reduce the risk of evaporation.

Also, an added feature to this option would be the fact that you've got an air monitoring system. So if there was an air release, we could try to contain that vapor release. Plus it would allow us to treat the waste

in place by encouraging the natural degradation and breakdown of the waste in place.

Our original comment period was scheduled to end September 5th. We've received a request to extend that comment period, and it will be extended to at least September 6th at this point. We'll review the comments as they come in. We plan to try to make our decision early this fall and publish a record of the decision. The immediate remedial design would then be conducted this fall, this winter, and into the summer. And we would hope to get a remedial action -- start accomplishing that in the fall of '95.

Some of the activities which would have to be conducted as part of the design would include some field activities. Of course we'd have to have a health and safety plan prepared in order to go out there which would insure the safety of the on-site workers as well as the community. The types of data to be collected would include topographic surveys, site inspection, soil sampling, as well as physical parameters.

Some of the components of the concept design that

I want to touch on so people are aware of what they should expect when we go to design would be a detailed evaluation of the specific risks that would be involved with each stage of the construction process. We have to look at the risks and say "What is the safest way to do what we need to do?"

I think we would also then select our cap materials and the actual thickness of the cover system based on looking at the hazards and the risk at the site. We would also then select the method for how are we going to remove the vegetation and things like that. Those would all be part of the concept design. We would also do a preliminary work plan to look at how we treat the waste in place and also to look at how the landfill is shifting over time.

Then, finally, the final design would cover any responses that we would get to the concept design as well as the specifications, the cost estimates, the construction schedule, the engineering report and final health and safety plan for implementing that.

In addition to the information that we've gone

through today, as Barabara mentioned, there are some documents that are out there in the public libraries, and there is a lot out there. We would encourage you, if you've got questions, to go through those documents, call our information line. We've got information displayed in the back. This is just some more of the information that is in the public record. We've got a fact sheet, and we've got the proposed plan which is a nice concise summary of what we're proposing, and a summary of the feasibility study and the rationale that we went through to come up with this preferred alternative.

Again, those are at the back. I would encourage anyone who's interested to please take one and please give us your input. Public input is very critical to our decision-making process. And that basically concludes my formal presentation. I'll now turn it over to Barbara. I think we want to allow the state and EPA to make a comment.

STEVE HIRSH: The EPA has been working with the Army with Edgewood since about 1986. In 1987 we saw the first feasibility study for the source at Old O-Field, and basically it looked at all the options that Cindy had up here, and the decision at that time was that none of these were developed enough to do anything about O-Field at that time. In 1991, as Cindy said, our ground water ROD was written. At that time it seemed like that was the most critical threat to health and the environment. So a ROD was written and a decision was made to put in that treatment plant. And I want to tell you that the construction of that is ongoing and completion of that is rather close, sometime early in the fall.

Again, in '87 they first looked at this and the Army looked at it again, and we did the hazard assessment. We reviewed all that data, and the EPA believes that the most significant threat for O-Field right now is the explosion threat or a vapor release. We evaluated the excavation option, and something that Cindy didn't mention is that if we could excavate all this waste out of there, we would still have an explosion problem. Right now there is no way to do that. There is no system. There is no off-site disposal facility for that waste.

So at this time the EPA agrees with the Army that

this is the right action to take. We concur with it, and we look forward to evaluating the comments that you'd like to submit.

JOHN FAIRBANKS: I'm John Fairbanks. I'm with the State of Maryland. As you can see from Cindy's presentation, O-Field is a very complex and difficult site to work on. The state has been working with the Army and the EPA since 1990. We took a little bite at the ground water. The state views this a little bite at the source. We've concurred with what the Army wants to do. But like the EPA, we'll certainly consider any of the comments that you have.

BARBARA FILBERT: Now we'll take any comments or questions you might have. Please raise your hand if you'd like an index card to write the question on and get back to us. Or, to make it easier for the court reporter, we do ask that you need to stand up when you state the question and state your name and where you're from before you ask your question. I'd also ask that just one person speaks at a time so the reporter can take everything down. Does anyone have any questions?

CHARLES GRACE: Charles Grace. G-r-a-c-e. I live over in the Joppa area on Joppa Road and Fountain Road. You know, it seems to me in driving here I don't get over into the east side of Pulaski Highway quite as much as the west; however, I see new developments. I see this school. We're setting off like a Love Canal. And it's incredible to me that all the years up through what we are today since 1954, that that existed and that any time we could have had an explosion, we could have had a fire. And all of this is reinforced by what we received from Harford County emergency evacuation plan.

And we're talking about now you're looking at options. Options that may or may not be something that's prudent, and we're looking at the state. They are agreeing to something that they don't know will work. And I guess I'll close on my horn here, but I don't really trust the Army. We had several years ago, you might recall, a chemical area building that was just horrendous in as far as any protection to workers, environment and/or containment.

The Army let two of our Harford Countians hang in

the wind, and you might all recall this, right. From that, when I hear this presentation, when I see now that they are going to come and make a decision, how can we possibly at this point -- we, speaking for myself, not say an expert, you know, in design, but how can we possibly confute or refute anything that you have there.

And my ultimate question, those three options, have they been tested? Are they new technology? So I think what I'm saying is that we in Harford County, we honestly, although we love this county, we honestly have been sitting on a powder keg here, and the Army has allowed it.

They have not done one earthly thing, obviously, from their testimony here. And if we may have explosions -- unplanned explosions -- vapors or phosphorous or whatever, then I suggest we all look at that emergency evacuation plan. I think that is should be more than what we have, and we should have a critical analysis from someone that is not connected with the Army, not connected with the state and not connected with the EPA.

CINDY POWELS: Thank you for your comments. I appreciate that input.

BRIAN FEENEY: I have a question. Brian Feeney. F-e-e-n-e-y. And my involvement in this is as the technical adviser to the Aberdeen Proving Ground Citizens Coalition. I hope to allay some of the gentleman's concerns that we are independent of the Army and EPA, and we represent the citizen's concerns. And I will have written comments later.

I just have one simple question now, and that is,

the operation and maintenance portion of units one and two may go on for a very, very long time. Have any contingencies been developed or considered for the possibility of global warming causing sea-level rises which might increase the trench area of Old O-Field and might also inundate the treatment system at operable unit one?
CINDY POWELS: I don't know how to say it except that we have not considered that.
BRIAN FEENEY: And would the Army consider that worth looking into and responding to?

CINDY POWELS: At this point in time, it's hard to say whether or not it is. I'd have to talk to our consultants as well and evaluate, you know, what the risks would be if we did have such climate changes, how it would affect the system. I don't know if Nora can add anything more. It's just something brand new.
BRIAN FEENEY: I would like to emphasize that while this may sound out of left field, it's something that the Army Corps of Engineers is already analyzing as relevant to maintaining the superstructure of the United States, the roadways and rails and so forth.
CINDY POWELS: That's a brand new idea that we have not considered. I would imagine that we have not

considered that for the other study areas that we're looking at. But I'd certainly like to talk about it some more because I'd like to learn more about it and see how it would apply to some of our study areas.

JOHN PAUL: Cindy, it might be useful for you to tell people how high above sea level the actual O-Field site is.

CINDY POWELS: O-Field is a local high there.

It's about ten to fifteen feet above sea level.

BRAIN FEENEY: What's the elevation of the waste water treatment system?

CINDY POWELS: Similar. I'll say about fifteen feet. I couldn't say for sure, but both that and the ground water treatment system are local highs in the area.

BRAN FEENEY: A related question is: It's fairly well known as a concern related to sea-level rise, the inundation of hazardous waste dumps up and down the East Coast. And this, of course, would be one of those. And what happens when you have inundation, you have a brand new site of hydrological effects that may affect that site.

CINDY POWELS: It would totally change the ground water treatment system because right now we are influenced by the surface water because it's shallow.

BRIAN FEENEY: And it would have a lot of very complicated effects.

KEN STACHIW: Let me address that. We view this as one of the remedies for a planning stage scenario that

projects options that would be either to dig it out and move it, or some sort of institution for utilization. We view this particular step as an interim phase in that direction. Once we're able to put a cap on it, it allows us to be able to maneuver on top of it. The possibility to institute further work or for that matter even in the future having a dig out of that, is much more feasible under any of these scenarios than it is in the current position. So we see that as an interim step in that direction if that's what we end up doing.

BARBARA FILBERT: Are there any other questions? If there are no more questions, I would like to remind you, as Cindy said, the public comment period which began on June 22nd ends on September 6th. They can be be postmarked no later than September 6th. They can be sent to Ms. Cindy Powels, Directorate of Safety, Health and Environment, U.S. Army, Aberdeen Proving Ground Support Activity. The complete address is in the fact sheet.

BRIAN FEENEY: I was going to ask you, there was and overhead with a series of task completion dates on

them, and it would be helpful is we could see that again.

CINDY POWELS: I think this is what you wanted. If there are no further questions or comments, then this will conclude our meeting. We'll be available afterward at the information display for anyone who has further questions.

BARBARA FILBERT: And there is a short evaluation form in the back of the room, or at the entrance, rather. And we would appreciate if you could just take a minute to fill it out before you leave. Again, thank you for your interest and time in the Proving Ground's installation and restoration program.

(Proceeding was concluded at 8:30 p.m.)

RESPONSIVENESS SUMMARY

II. RESPONSES TO COMMENTS RECEIVED AT THE PUBL
MEETING

Response to Mr. Grace:

The Army will continue to seek and incorporate the participation o
decisions related
to the Installation Restoration Program at APG. The Army desires to gain t
the public that
their best interests have been considered. Also, the Army wishes to empha
overall protection
of human health and the environment is the principal goal of all Army envir

The remedy proposed for the Old O-Field source area, construction
Infiltration
Unit, is a new technology that has been developed specifically for this uni
our best
understanding of the physical characteristics of the site and the risks pos
remedy will
greatly reduce the possibility that dangerous chemicals will be released fr
future. The
remedy will accomplish this by stabilizing the site, minimizing the possibi
explosion,
providing blast protection, and attenuating any vapors that coulde be relea
This remedy
also allows the Army to continue to test more permanent remedial technologi
the stability
of the site and the effect of enhanced leaching of the contaminants from so
although not
tested at other sires, offers many advantages over the other technologies c
offers
better protection of human health and the environment with smaller short-te

Response to Mr. Feeney:

Global warming may certainly have far-reaching effects on environment
in the
future. As the implementation of the remedies for OU1 and OU2 continues, t
consider the
effects of a potential rise in the sea level on both the Old O-Field source
treatment

system.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED THE PUBLIC COMMENT PERIOD

A. COMMENTS RECEIVED FROM THE ABERDEEN PROVING GROUND SUPERFUND CITIZEN'S COALITION

General Comment

Comment: Although APGSCC concurs with the U.S. Army and the U.S Environme Protection Agency (EPA) that the Permeable Infiltration Unit (PIU) appears to protective of human health and the environment of the five proposed alterna members of APGSCC continue to have a number of questions and concers proposed action. Old O-Field is a very complex site; not onl variety of toxic as well as explosive compounds present on the site, many uncertainties associated with the site. It is difficult predictions on many aspects, including the potential for explosions, the hum and the impact of proposed actions on the stability of the site. we must proceed carefully and cautiously, being sure that tax do wisely.

Response: The Army agrees that the action must proceed cautiously and t expenditure of public funds is paramount. The Army believes that the risk r will result from construction of the PIU on Old O-Field greatly ou risks associated with the construction process. During constructio minimized by selection of the safest construction and monitoring method been built, it will stabilize the site and minimize the likelihood from Old O-Field. The conceptual design phase for the PIU will evalua construction methods to control and minimize the risks during construction

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

Comment 1.

Comment: A primary concern of APGSCC is whether the Army has adequatel considered the impact of the proposed action at OU2 (i.e. placement of the P groundwater treatments system that is currently being constructed at Old to consider the extent to which placement of the PIU will alter direction of flow of the contaminated groundwater and 2) the types and con chemicals present in the groundwater. Enlargement of the contaminant p exists under Old O-Field will most likely occur after placement of t pressure from the weight of the sand and due to the additional wate onto the field to maintain the desired level of moisture. Wi treatment system be able to capture and adequately treat all from Old O-Field after installation of the PIU? Have estimat amount of water that will need to be pumped onto the capped area? T IRA proposed for OU2 is, in large part, dependent upon the effica treatment system. It is not clear to APGSCC that APG has con scenarios for changes that might be needed in the OU1 treatme placement of the PIU.

Related to this issue is that fact that the Army may also use facility to treat contaminated groundwater from other source O-Field, an unnamed site west of Old O-Field and the J-Field To Citizens must be assured that the OU1 plant will not be loaded beyond capac increases in treated gallons/day will not occur at a faster rate than t and enlarged.

APGSCC is also concerned about what affects potential explosi

integrity of the OU1 water treatment system and the monitorin
Old O-
Field. Has the Army considered possible scenarios in this ar
explain in
detail.

Response: The potential impact of the proposed action on the OU1 treatm
matter of
prime importance to the Army. As noted in the comment, the O
treatment
system has been overdesigned purposely, and the treatment fac
been
oversized to allow further increase in plant capacity if nece
assessment
of PIU operations (including addition of water) indicates tha
the
treatment system will not be exceeded. However, the OU1 grou
and
extraction systems will be reevaluated during the design phas
the
need for additional wells. This evaluation will be performed
computer
simulations of the PIU are being conducted to model the effec
water
to Old O-Field on groundwater flow. The model results will b
locations
and depths of new extraction wells, if any are required. Sec
to
be collected from the existing monitoring and extraction well

changes to groundwater flow direction and changes in contamin
when
water is applied. These data will be used to confirm that th
capacity
is not exceeded.

The premliminary model scenarios have incorporated applicatio
the range
of 20-40 gallons per minute, without yielding significant imp
flow
direction or the water table. Estimates of probable water ap
effect
on the existing and expanded extraction system will depend on
which
will be considered during the design phase.

With the addition of the air stripping and carbon adsorption
groundwater
treatment system has evolved into a very flexible system that
high
concentrations of organic and inorganic contaminants. At pre
the
system is twice what is needed for the OU1 extraction system.
expects that the OU1 system will be capable of handling the a
resulting from
the addition of the PIU. To ensure that the OU1 system will
limits, the
design phase for OU2 will include an evaluation of all credib
potential
effects on the OU1 treatment system. Any required upgrades o
extraction and treatment system will be considered in the OU2
implementation.

The Army has considered the possible effects of explosions on
operation
of the groundwater treatment system. For the current conditi
conceivable, although unlikely, that an explosion could damag
systems and temporarily interfere with operation of the syste
benefits of the PIU is that it will reduce the likelihood tha
place at
Old O-Field. The primary potential cause of an explosion at
the
chance of fire will be minimized by greatly reducing the flow
materials
through construction of the PIU. Shock or pressure on ordnance are
causes of an explosion at the site, and this will be eliminat
sand,
which attenuates transmission of applied forces to the ordnan
the
design of the PIU will attenuate fragment velocities and blas
explosion
does occur, which reduces or eliminates the damage such an ev
Therefore, the PIU will afford protection to the treatment sy
explosive event. During construction of the PIU, contingency
to
address any potential effects on the OU1 treatment system.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

Comment 2.

Comment: It is very important that a good monitoring program be establ this interim action to assure that placement of the PIU does not cause con from Old O-Field in higher concentrations or via different pathway under investigation. Groundwater from monitoring wells around Old wells pumping water to the treatment plant must be tested on a regu suite of possible contaminants and for all forms of radioactivity t groundwater contamination are detected early. Additional mon piezometers might well be needed to adequately monitor ground contaminant migration. Sediments, benthic organisms and pore Creek and the Gunpowder River should also be monitored to measure c contaminant inputs in areas near Old O-Field. These results will safegua environmental contamination which could result from changes i direction of groundwater flow or from a greater release of contaminants fro within the landfill.

Response: The Army believes that a comprehensive program to monitor gro surface water, air, and PIU stability is a critical part of the proposed int in the response to Comment 1, the ability of the existing groundwate capture all of the contaminated water emanating from Old O-Fi If needed, the extraction system will be upgraded to ensure capt contaminated plume, which will be verified by regular perform the OU1 system. There is less need to continue monitoring of sedimen and pore water from Watson Creek and the Gunpowder River because pathway from Old O-Field to these media, after completion of groundwater and therefore contaminants will no longer continue to migrate addition, potential contamination within these media is being the overall RI/FS for O-Field.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

Comment 3.

Comment: APGSCC is concerned about potential radiation contamination w
fenced area of
Old O-Field. Historical documents indicate that radioactive
animal
carcasses were once buried at Old O-Field. Has past sampling
monitoring for radioactivity? If so, what monitoring wells w
this
sampling take place? Was radioactivity ever detected in eith
at Old
O-Field? If so, what were the levels of radiation found and
were
they compared to? APGSCC would like to know whether the Army
conducted
a thorough search of its Atomic Energy Commision (AEC) or Nat
Commission (NRC) licenses to determine where radioisotopes we
disposed of on base.

Response: The historical information indicates that the animal carcasse
from Old O-
Field shortly after burial there to prevent other animals fro
Therefore,
there is no reason to suspect radiological contamination. Du
investigation
of Old O-Field conducted in 1985-1986, groundwater samples we
monitoring wells OF6A, OF6B, 0F6C, and 0F17A (located downgra
O-Field)
and analyzed for gross alpha, gross beta, tritium, and cesium
were
not detected as significant levels.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

Comment 4.

Comment: The stability of the cap placed on Old O-Field is an important i
selection of the
best alternative as the interim remedial action for the Old O
reason for selecting the PIU cap over the foam and RCRA caps
to

settling, trench collapses, and explosions can be repaired mo
consideration has been given to the general stability of the
will
be much more prone to erosion and will probably require a sig
"routine"
repair. Has this been adequately calculated into maintenance
cap
be stable enough to function as intended?

Response: The PIU is expected to require smaller amounts of care and maint
other
caps under consideration because of its "self-healing" capabi
trench
collapse or other subsurface movement, the sand will tend to
depressions.
During construction of the PIU, it is likely that hydraulic c
where
the sand layer is alternately wetted and allowed to dry. Hyd
greatly
increase the stability of the PIU. Erosion control will be a
design.
One option under consideration is the use of a geotextile lay
prevent erosion by wind and water, and a layer of gravel on t
it
and allow drainage into the PIU. The estimated costs for mai
have
been included in the cost estimate presented in the Focused F

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT PERIOD

Comment 5.

Comment: APGSCC is concerned that health risks associated with the Old
Area
(OU2) have not been properly estimated because of the inabili
collect soil
samples from within the fenced-in area. The difference in co
between
outside the fence and the center of the 4.5 acre area could b
robotics
sampling methods be used to obtain samples from within Old O-
there a
danger that the robotics device might ignite a fire or initia
release chemical agents into the atmosphere? If robotics are
degree of danger faced by site workers walking on the surface

Response: As discussed in the Focused Feasibility Study Report, the risks
health
and the environment by the contaminants in surface soil withi
less
than the risks posed by the potential for an explosive releas
O-Field.
In addition, any action taken to mitigate the explosive risk
risk
posed by contaminants in soil. By constructing the PIU on Ol
and
animals would not be directly exposed to the contaminants. L
contaminants
from soil into the groundwater would not pose risks because t
extraction
and treatment system would remove the contaminated water from
treat
it to levels safe for discharge to the Gunpowder River. Ther
directly
sample the field (with the corresponding risks associated wit
activity)
is eliminated by construction of the PIU.

The risks associated with direct sampling of soil within the
robotics, are
not justified, given that the data collected by such sampling
serious
risks (posed by the contaminants in soil), which will be miti
concurrently
with the more serious risk of an explosion of fire.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

Comment 6.

Comment: APGSCC would like to have the Army make new data that is derived
the ongoing
RI/FS process for Old O-Field available to the public in a ti
changes
in the logic of this alternative selection or changes in the
selected
alternative that are suggested by new data must be made known
be
included in the public process. For example, APGSCC would li

about
the contributory role of the other two contaminated O-Field a
and
the unnamed area, and whether the groundwater treatment syste
contaminants from these areas.

Response: The Army will continue to make every effort to keep the communit
APGSCC
informed of new findings at the O-Field area. For example, t
Phase
I of the ongoing RI/FS effort has been sent to Army, EPA, and
reviewers
and will be released to the public as soon as review comments
by
DSHE and addressed. The Focused Feasibility Study report for
sent to
APGSCC reviewers immediately after comments by the Army, EPA,
incorporated.

The "pit site" is under investigation, initially by performing g
sampling of nearby monitoring wells. From available data, it
groundwater emanating from the "pit site" is not contaminate
and
is flowing toward the Gunpowder River. The groundwater from
not be
captured by the OU1 extraction system as currently designed.

The nature and extent of contamination at New O-Field has bee
Phase
I RI effort. Groundwater from New O-Field flows toward the e
into
Watson Creek. The current OU1 groundwater extraction system
contaminated groundwater emanating from New O-Field.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

Comment 7.

Comment: In the APG fact sheet on Old O-Field, the Army mentions the huma
that could
potentially be exposed to contamination present at the Edgewo
There
is no mention of the 10,000+ population in the Joppatowne are
APGSCC has continually brought this oversight to the attentio

Joppatowne area has a large population that is, in some insta
contaminated areas at APG than either Edgewood or Magnolia.
wonder whether this community is considered when the Army con
Such
an oversight casts doubt on the thoroughness and thus the cre
investigations. Also, without mention of the community in th
sheet,
many citizens in this area may be misled into believing that
potentially
exposed population.

Response: In the Record of Decision for OU2, Joppatowne, Edgewood, Magnoli
Graces
Quarters are denoted as the off-post area closest to Old O-Fi
communities are considered in the risk assessments performed

In the Focused Feasibility Study report for Old O-Field (APG, 19
modeling was performed to assess the risks posed by an explos
Field. It was concluded that the chance that off-post commun
by
an event at Old O-Field is very small. It is more likely tha
such as
H-Field, N-Field, and J-Field would be impacted due to proxim

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

Comment 8.

Comment: This interim action, as with so many others, is a "cap it and wa
our
hazardous waste technologies are not sufficiently developed t
wastes present at this site. This is a very important issue
immediately. We must place every effort on developing new te
hazardous wastes if we are to do more than just "contain" our
time it
appears that the Army is willing to wait until the private se
techniques,
but there is little incentive for private industries to spend
systems that
are suitable for Army specific chemicals. It is time for the
responsibility and devote resources to this need. In the pas
was
more than willing to spend money developing, designing and ma
various

munitions needed to defend our country. They must now commit
developing final solutions to our hazardous waste problems.

APGSCC would like total clean-up and remediation of APG's haz
not
interim, less than ideal solutions.

Response: The Army prefers remedies that effectively mitigate the ris
and will
choose such final remedies where possible. The Army has esta
development programs to develop technologies potentially appl
ordnance disposal sites, such as robotic excavation, in situ
incineration of CWM, and others. However, the currently avai
permanent-treatment
technologies pose short-term risks that the Army believes are
application at the Old O-Field site. O-Field poses unique ha
workers
because of the presence of potentially live ordnance and CWM.
construction
of the PIU would not elimiate the risks posed by an explosive
the
likelihood that such an event would occur in the future, as w
effects.
Many contaminant release and exposure pathways (vaporization
explosive
releases, direct exposures to the wastes, and exposure to con
are
removed or minimized by construction of the PIU and the OU1 i
this
site, selection of the PIU represents the use of risk managem
whereby the short-term risks have been weighed against the po
reduction that would result from stabilizing Old O-Field.

In addition, unlike other capping actions, this interim actio
elements. The
design of the PIU specifically allows and promotes testing of
and
degradation of the buried materials and geotechnical evaluati
assess
future excavation options.

RESPONSIVENESS SUMMARY

III. RESPONSES TO WRITTEN COMMENTS RECEIVED DURING THE PUBLIC
COMMENT
PERIOD

B. COMMENTS RECEIVED FROM MR. GAIBROIS

Comment 9.

Comment: Question 5 Comments - Alt C 'install a permeable infiltration
that this 'unit'
is not specified as a semi permeable barrier which would only
in one
direction, that the item as described could allow gross trans
through the barrier. the identification of a infiltration "m
through the system. That is not containment of a hazardous w
use
of 'unit' implies a mechanical/chemical device to use top pro
be
'treatment' of a hazardous waste IAW RCRA for which a permit

Response: The PIU has been designed to allow the flow of water down throug
This will
allow rainwater and other solutions to percolate through the
materials. This process will allow the natural degradation o
continue.

For on-site treatment under a CERCLA response action, a permi
although
all substantive requirements of such a permit, if issued, wou
selected by the Army.

Comment 10.

Comment: Comments and Suggestions - I would recommend a combination of al
Alt A-
no action, and B-limited action are totally not appropriate.
A and
B, unlimited or full action has already been agreed to by APG
no
matter which alternative is used.

Response: The Army believes that selection of Alternative C (construction
significant
advantages over those offered by Alternatives D (foam cap) an
cap). The
PIU would stabilize the surface of Old O-Field, minimize the
and
explosive release, and allow the natural degradation of the b
continue.
The PIU also offers advantages in ease of construction and ma
reduces
the long-term risks even further. Therefore, the Army, with
and
the State of Maryland, will implement Alternative C.

RESPONSIVENESS SUMMARY

IV. RESPONSES TO SURVEY FORM SENT TO CITIZENS ON THE APG MAILING LIST

Survey forms were sent to over 300 citizens on the APG Installation Restora (IRP) mailing list of interested community members. A total of 45 responses w during the Public Comment Period. Of the 45 responders, 33 people supported the se Alternative C. Several community members indicated no preference among the remedial and several people preferred Alternative E.

RESPONSIVENESS SUMMARY

V. RESPONSES TO SURVEY FORM SENT TO ALL TECHNICAL REVIEW COMMITTEE MEMBERS

A total of five responses were received from Technical Review Comm during the Public Comment Period. All five responders fully support the prop